Sepon Supports UXO Clearance in Laos

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Sepon mine, owned by the largest international mining company in Laos, MMG Lane Xang Minerals Limited Sepon (LXML), is situated in a remote area of Vilabouly District, Savannakhet Province—one of the most bombed districts in Lao PDR. Over 21,000 people have been killed or injured as a result of unexploded ordnance (UXO) accidents in the post-war period (1974–2018), of which 25 percent were in Savannakhet Province.¹ This legacy brings unique challenges to mining operations, development projects, and agricultural production.

LXML has integrated UXO clearance as an essential activity in its mining cycle. This ensures employees and communities are safe and will sustain a lasting legacy for agricultural activity in the future. Additionally, LXML has invested in software and hardware via strategic partnerships to enhance technical capacity and improve clearance practices in Laos.
Since 1996, LXML has invested over US$45 million in UXO activities, clearing around 2,900 ha (7,166.1 ac) of land and destroying over 58,000 UXO items. Up to 80 percent of the 125,000 ha (308,881.7 ac) of concessional land granted to LXML by the Lao government was heavily bombed during the Indochina War as part of the logistics route known as the Ho Chi Minh Trail. In Sepon, UXO clearance is conducted before exploration, mining, civil engineering, and to support projects and local villages’ activities surrounding the mine and archaeological site areas. In the 1990s, UXO clearance was conducted before exploration and local roads and tracks were cleared and enlarged during the exploration phase, allowing the local population safer and better access to rice fields and plantations.

UXO clearance before civil engineering, such as the rehabilitation of Road 28A—a main transport route linking Vilabouly with Road 9 (Savannakhet Province’s main east-west highway)—involved a shallow search to a depth of 25 cm (9.8 in) followed by a deep search to a depth of 250 cm (98.4 in) along the entire stretch. Thousands of submunitions, bombs, rocks, and other ammunitions were cleared, allowing safer road access for the Vilabouly community.

In partnership with Sunlabob Renewable Energy, LMXL supported development projects and provided safe, sustainable water supplies to villages in Vilabouly by using solar-powered pumps to draw water from unusually deep bore holes, which were not amenable to using hand pumps. This project resulted in UXO clearance for the twelve targeted villages comprising almost 3,400 community members.

The Mandarin Project, a partnership with Australian company Ironbark Citrus, created an avenue for Lao farmers to move from subsistence to commercial agriculture by enabling smallholder families to grow mandarin oranges using best practices and current technology. Before any planting could commence, land areas were cleared from UXO. To date, beneficiaries of the project have planted mandarins covering nearly 22 ha (54.4 ac) of land.

UXO Work in Numbers

Building on this framework, LXML partnered with the Lao Ministry of Defence, the National Regulatory Authority (NRA), and Lao National Unexploded Ordnance Programme (UXO Lao) to improve UXO clearance standards in Laos by enhancing the capacity of Lao UXO technicians. The accredited explosive ordnance disposal (EOD) training programs were developed in cooperation with the NRA to provide recognized qualifications and experience in UXO clearance techniques.

In 2016, LXML founded, hosted, organized, and managed the 5th NRA Senior Explosive Ordnance Disposal (SEOD) course to build capacity for Lao Explosive Ordnance Disposal (EOD) technicians. The EOD training materials provided by LMXL are systematically sent to NRA for quality assurance and to ensure they align with NRA standards and the battlefield clearance operator (BCO) EOD levels 1, 2, and 3, as well as SEOD, the in-country EOD level 4 qualifications.

In 2016, 35 LXML employees successfully completed the EOD levels 1 and 2, increasing the number of qualified Lao personnel capable of supporting UXO operations. A further nine employees completed the pathfinder training, an in-house training to those who have completed and qualified for EOD level 1. The pathfinders are trained to accompany non-EOD LXML technicians (geologists, environmentalists, and community-relations employees) to work areas that have not been cleared and may potentially contain UXO. Pathfinders use a basic metal detector to find the safest path for people they accompany. Pathfinders’ roles are to detect and mark UXO, not to excavate UXO. Instead, they will mark each contact found or spotted item of UXO from a safe distance and guide their group safely around the hazards. The qualified employees who completed the above training are now working in survey or geology and continue to support LXML’s UXO and other operations.

Hardware: Increasing Speed and Accuracy of Detection

LXML continues to investigate and invest in technology to improve target detection and identification. It has developed advanced geophysical gravitational and electromagnetic survey methods to deliver productive clearing activities to support operations, particularly open pit mining. In 2015, LXML introduced new equipment to enhance UXO detection. The UltraTEM II Deep Bomb Detection System was developed by Australia’s Gap Explosive Ordnance Disposal (GapEOD) in close coordination with LXML geophysicists.

UltraTEM is a time domain, electromagnetic system using multiple three-component sensors on a mobile frame.
The system provides high-definition mapping of buried UXO, accurate estimates of position and depth, and produces a digital recording. The stored digital recording can be further analyzed and calibrated with results in the field. UltraTEM can detect UXO in a single pass in a range of background conditions that proved difficult for other equipment, increasing both speed and reliability. The system is capable of detecting Mk 81 aerial bombs at depths of up to 5 m (5.5 yd) in good geophysical ground conditions, although the operational target is a clearance depth of 3.5 m (3.8 yd). In areas where the geophysical ground conditions are poor, based on the quality of the data and operating experience, the detection depth is reduced by up to 50 percent.

The UltraTEM loop is powered by a low noise generator and signal generator mounted on a support truck, allowing for the unit to be easily relocated.

The UltraTEM is maintained by a team of five operators under the supervision of a specially trained Lao EOD level 3 supervisor. The supervisors send data collected for interpretation. Data is then sent back with a list of potential UXO that need to be investigated. The system has proven robust and reliable in the field with electrical connectors requiring checks and maintenance for operation.

LXML has a strong commitment to ongoing improvements and has fully supported these activities by participating in standardization and field trials. The company’s experience...
is shared with the local and international UXO clearance community working in Laos. LXML attends the NRA UXO Technical Working Group that meets every three months in Vientiane. The activities undertaken by the attendees is shared openly at this forum.

Additionally, LXML held a detection trial at Sepon in late 2014 to assess the suitability and cost effectiveness of advanced ordnance detection systems for small ordnance. Using blind seed (i.e., free from explosive (FFE) inert material) test sites, a number of advanced systems were compared with each other as well as with systems that were currently in use. Multiple systems were considered to be viable UXO detection systems, but the trial highlighted the importance of accreditation, operational standards, and quality management processes. The organizations that were involved included the Geneva International Centre for Humanitarian Demining (GICHD), LXML, UXO Lao, and NRA.

Assurance: Maintaining the Quality of UXO Clearance

Throughout 2017, LXML reinforced quality management via UXO blind seed, which was planted in the ground to be detected and cleared. This ensures UXO teams are consistently achieving and delivering high-quality clearance for the benefit and safety of mining operations and surrounding communities. LXML’s UXO quality management coordinator plants a
number of blind seeds, which consist of one-half of a FFE BLU 26 (a single shell of a cluster bomblet BLU 26), at the UXO clearance sites planned for the day. The ratio is a minimum of one blind seed for every twelve detectors working that day, i.e., additional blind seeds being planted for each additional set of twelve detectors. Blind seed positions are recorded by GPS and are entered and overlaid by the Lao National Geographic Department’s Graphical Information System (GIS). The blind seeds are monitored every day by the GIS when entering the daily work record in the system. Any blind seed remaining and appearing in shallow, cleared-area maps would immediately alert the UXO coordinator of a deficiency and would initiate an investigation and preventive action. The daily clearance record by operators and site supervisors also identifies the operator that cleared the lane where the UXO was missed and where EOD level 2 and 3 supervisors conducted their quality check.

Blind seed FFE Mk 81 250 lb (113.4 kg) UXO were also placed regularly throughout the year in different mine pits to maintain assurance of the quality of the geophysical digital data collected by UXO teams in the field and the quality of the geophysicist’s interpretation. Random dataset samples were regularly sent to a third party for independent verification and review, with both parties of geophysicists (independent and LXML) critiquing the results.

With a single international EOD expert remaining in the LXML UXO team at Sepon since 2016, the newly qualified SEOD national employees (EOD level 4 qualification) now take a larger role to ensure compliance with NRA standards and to maintain a safe and professional approach. SEODs are now more involved in the NRA technical working group and LXML SEODs are in charge of planning and coordinating UXO field operations. This experience will enhance capacity in future.
Harnessing UXO Knowledge: Saving our People and Communities

LXML achieved zero UXO-related incidents within its clearance team and consistently champion one of LXML’s core values: Think Safety First regarding the unique hazards associated with UXO clearance. In 2017, fifty LXML employees and contractors joined hands for an UXO awareness day. The purpose was to raise awareness around UXO hazards.

LXML also provides financial support to the Cooperative Orthotic and Prosthetic Enterprise (COPE) in Vientiane in its awareness raising activities. COPE was established by the Lao Ministry of Health in 1997 to ensure that people with physical disabilities have local access to affordable, nationally-managed rehabilitation services. In 2008, COPE opened its visitor center to increase awareness about disabilities in Laos and highlight the work to help people with mobility-related disabilities lead full and productive lives with access to quality prosthetics. Throughout its history, COPE has provided comprehensive support for the government of Laos’ mobility-related rehabilitation efforts. COPE services are also used for amputees in road accidents and other trauma.

In Laos, LXML is supporting development and is keeping people safe by enhancing capacity, investing in modern technology, and raising awareness of UXO through active partnerships with key players in the UXO sector. See endnotes page 62

Michael Valent
Mine Technical Services Manager
MMG LXML Sepon

Michael Valent is Manager of Mine Technical Services at LXML. He holds a Bachelor of Engineering (Mining) and an Executive Masters of Business Administration. Michael has over 35 years’ experience in the mining industry. He has extensive risk management experience and has worked with high-hazard environments such as open pit mining in and around underground voids and with the LXML operations, open pit mining, and clearing in land contaminated with UXO. Michael enjoys building the capability and accountability of the technical functions and operations personnel to support safe and productive mining that continuously improves.

Saman Aneka
Managing Director and Stakeholder Relations Manager
MMG LXML Sepon

Saman Aneka is Managing Director and Stakeholder Relations Manager at LXML, and Vice President to the Advisory Board of the Lao National Chamber of Commerce and Industry. He currently provides strategic guidance to the LXML Board as Managing Director and leads the Stakeholder Relations function. Aneka has over thirty years of experience in the mining industry, locally and internationally. He has extensive field experience in Australia, China, Indonesia, Papua New Guinea, Philippines, and Thailand. With his expertise, Aneka was involved in the early days and inception of LXML. He has extensive institutional knowledge of the company and industry in Lao PDR. Aneka holds a master’s degree in hard rock geo-mineral exploration.

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