

# **GOLDCORP - MARLIN MINE**

**GUATEMALA'S GOLD STANDARD**



# GUATEMALA'S GOLD STANDARD

*The first gold mine of significant size  
in Guatemala, Goldcorp's Marlin Mine  
continues to make new discoveries  
that are increasing its life expectancy*

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Having been in production since late 2005, it took less than five years for Goldcorp's Marlin Mine to produce its one-millionth ounce of gold. Located in the western highlands of Guatemala, 300 kilometres northwest of Guatemala City in the municipality of San Miguel Ixtahuacan, in an area boasting elevations ranging from 1,800 to 2,300 metres above sea level, Marlin has operated as both an open pit and underground mine, and continues to generate significant cash flow.

Marlin Mine was originally discovered in 1998 by two Guatemalan geologists. Acquired in July 2002 by Canadian Company Glamis Gold, it was they who, in conducting an exploration study, determined that the mine held a projected 1.4 million ounces of gold.

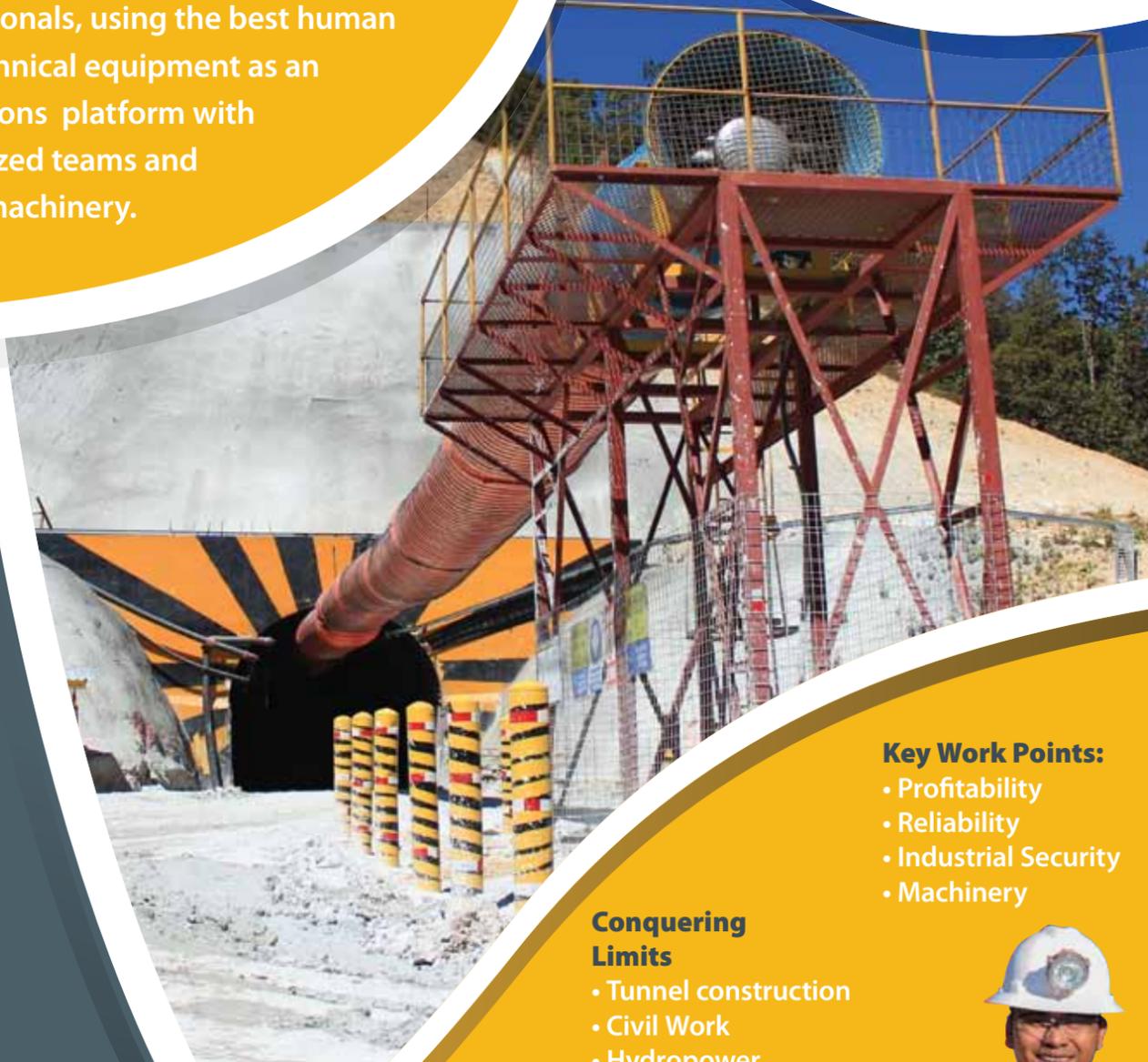
On 27 November 2003, the Ministry of Energy and Mines of Guatemala issued a licence for the development and operation of the Marlin project and following the successful completion of the construction phase in the third quarter of 2005, the mine began producing gold and silver before the turn of the year.

In the time between 2003 and 2006 approximately \$300 million was invested into the operator's exploration activities and overall preparations for exploitation. It was then in 2009 that Goldcorp invested an additional \$69 million into the operation, with a similar figure being ploughed into the business in 2010. Such was Goldcorp's commitment to the long-term success of the project that it remains on course to have invested a further \$150 million into Marlin Mine by the end of 2014.



Panoramic view of the processing plant

Grupo EMO's leadership rests on the application of specialized, trendsetting techniques in technology, planning and developing in each and every one of our underground constructions, tunnels, open space operations and civil work for hydroelectric. The application of these techniques is performed by highly qualified local and international professionals, using the best human and technical equipment as an operations platform with specialized teams and heavy machinery.



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- Machinery

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**GOLDCORP - MARLIN MINE**



Local workers

Lying within a highly prospective land package of approximately 100,000 hectares that encompass the main deposit and various important vein structures and mineralised zones, the Marlin site hosts four major lithologic units, those being pyroclastic deposits, marlin andesites, tertiary volcanoclastic sequence and porphyric dykes.

Marlin was the first gold mine of significant size in Guatemala and because of this Goldcorp made it a matter of great importance to build lasting partnerships with communities surrounding the mine site. To

**GRUPO EMO**



Since 2004 GRUPO EMO, S.A. has been an strategic supplier for underground mining operations to GoldCorp. Recognized in the Marlin Mine site as prime contractor for underground projects and forming part of the mine development and ore recovering team, GRUPO EMO has offered a wide range of activities for underground applications including mine development, service installation, bolting and ventilation, also different type of underground support systems including cement and chemical grouting, production mining with long hole equipment and hauling, shotcrete applications and other underground civil works. GRUPO EMO's focus on professional capabilities in safety and reliable operation and the continuous formation process of our staff, adds to our company's inventory a steadily enlarged knowledge as well as personal attitude, loyalty and high quality standards, as the most important values we are transferring to our client.

GRUPO EMO has been the pioneer introducing professional underground construction in tunneling and mining in Central America obtaining a sound reputation for its professional engineering capabilities, development of human resources and total commitment to safe and secure working environment. GoldCorp and its local representative Montana Exploradora have recognize this kind of support and continues to contract additional tunnel construction with a full program of wire mesh and split set installation. We are also looking forward to serve as hauling contractor for the open pit re-naturalization program. We feel fortunate and proud to form part of the GoldCorp/ Montana family for the last eight years and we look forward to continue our successful cooperation in the future.

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Nursery environment

**“IT TOOK LESS THAN FIVE YEARS FOR GOLDCORP’S MARLIN MINE TO PRODUCE ITS ONE-MILLIONTH OUNCE OF GOLD”**

this day the company continues to have a positive impact on the lives of families in the area through the creation of increased health, economic, educational and social opportunities. Furthermore, of the mine’s

1,905 workers, approximately 98 percent of these are Guatemalan residents.

These employees operate each day knowing they are protected by Marlin’s stringent health, safety and environment rules and

standards. Indeed, the safety culture one will find present at the mine has benefited hugely from countless successful safety initiatives that have been implemented throughout the years, including daily and weekly safety briefings, monthly inspections and ongoing training programmes.

The mine also operates in full compliance with the environmental standards and regulations of Guatemala and to the mining industry guidelines as set out by the World Bank. Furthermore, Marlin adheres to the internal Goldcorp standards in order to

ensure that the highest level of environmental stewardship is achieved. Marlin’s Environmental Management System (EMS) is designed to promote continuous improvement in the environmental management of the operation. The EMS concentrates on four phases, those being policy and planning, implementation, evaluation, and review and Improvement.

Of equal significance is the fact that Marlin holds the distinction of being the first mine in Central America to become fully certified under the International Cyanide

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## GOLDCORP - MARLIN MINE

Management Code, which is recognised as the international benchmark for transporting, storing and using cyanide.

However, long before any Goldcorp mine commences with production the company will have already put plans in place for its eventual closure and the subsequent reclamation of the land. The Marlin Closure Plan for the open pit and waste rock storage facility was approved by the Guatemalan Ministry of Environment and Natural Resources (MARN) in October 2012.

Goldcorp's wholly owned subsidiary, Montana Exploradora de Guatemala,



A local farmer

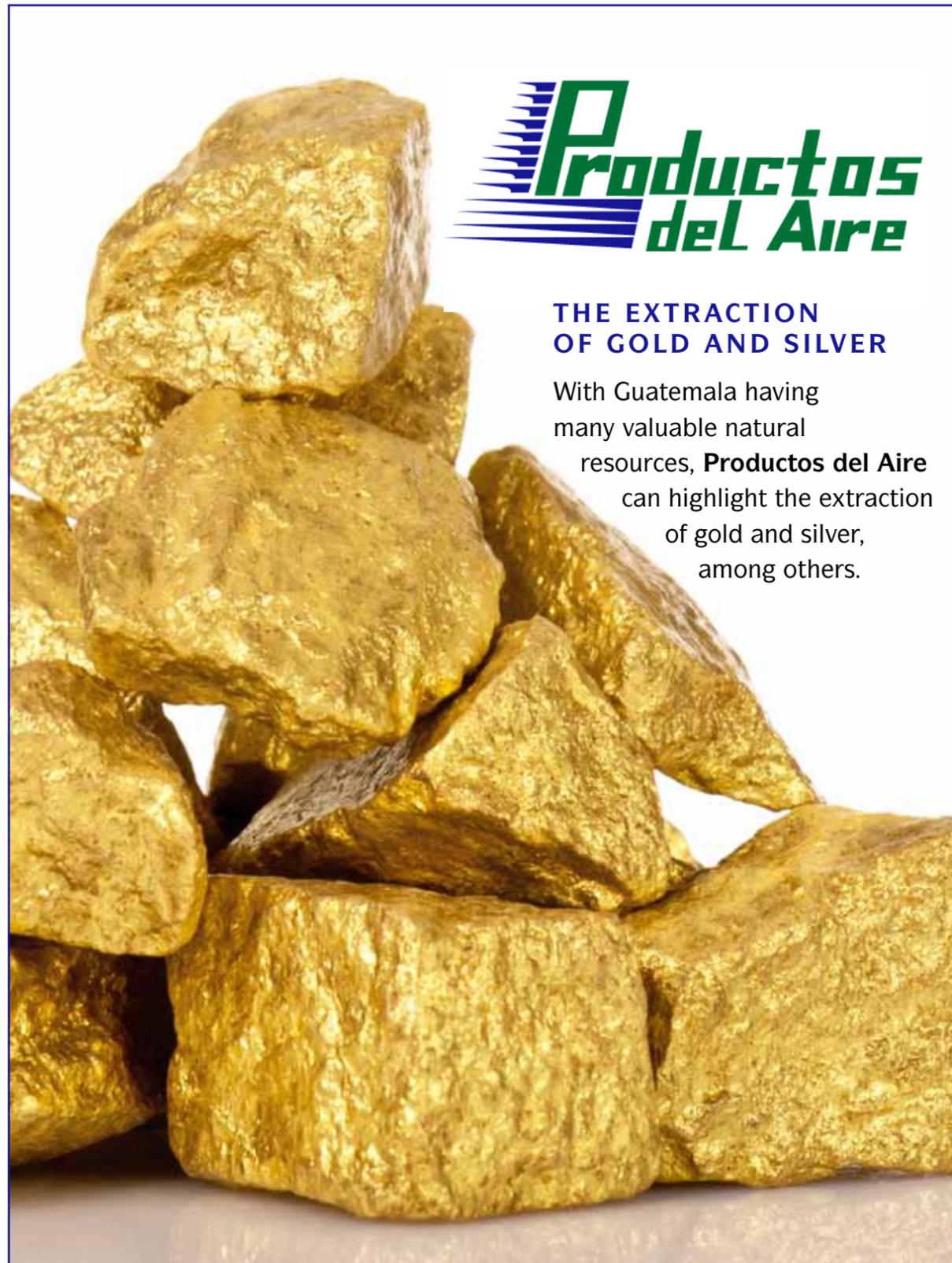
### EVERLIFE

EVERLIFE is a Guatemalan firm with 10 years of experience, dedicated to provide consultancy and assessment, with the highest professionalism and quality, in environmental, social and business management issues. We are conformed by a multidisciplinary team of professionals with extensive experience in extractive industries, renewable energy and transmission and distribution of electricity, among others. Our reputation has given us the opportunity to serve some of the most important and largest companies and projects in Guatemala. We are proud to serve Goldcorp and to be able to contribute, through our services, to the sustainable development of mining activities in the country. One of our most important projects is the Environmental Impact Assessment study (EIA study) that was prepared for the Technical Closure of the Marlin Mine Open Pit, which was the first



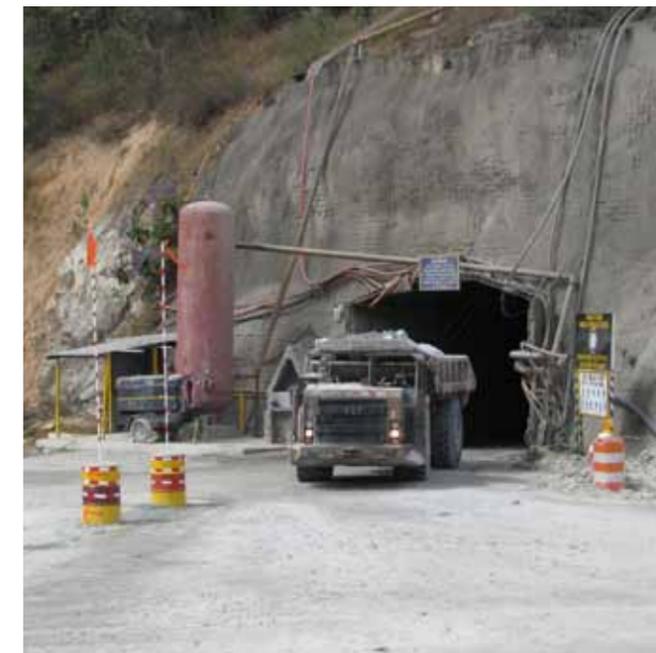
environmental instrument of its kind analyzed and approved by national authorities. We have also worked on EIA studies for mineral exploration licenses and permits. Guatemala is a country rich in cultural diversity, conformed by 24 ethnicities and the same number of languages. This is a very important part of our expertise, due to the fact that in many projects there is a need to carry out the Public Participation Process with different ethnical groups at once. At EVERLIFE we know our business and we understand how vital this is for your investment and that's why we offer integral solutions, supported with the use of top of the line technology and equipment, approved and recognized by international environmental agencies.

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**THE EXTRACTION OF GOLD AND SILVER**

With Guatemala having many valuable natural resources, **Productos del Aire** can highlight the extraction of gold and silver, among others.



Mine entrance

submitted the corresponding compliance bond to the MARN in the amount \$28 million on October 16, 2012. The closure compliance bond amount established with MARN will be adjusted according to actual conditions and as subsequent sections of the closure plan are updated, reviewed and approved by the MARN.

Subsequent sections of the closure plan will be updated as required by the MARN. The geochemical, hydrological and geotechnical assessments required for the Tailings Impoundment Closure Plan was conducted during 2013, and a final plan is expected to be submitted to the authorities before the end of 2014.

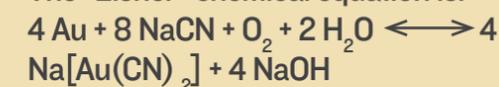
**PRODUCTOS DEL AIRE DE GUATEMALA**



The extraction of gold with cyanide seeks to convert insoluble gold in complex metal anions soluble in water.

After being removed and crushed, the mineral is separated from the sludge by Elsner's equation adding cyanide and oxygen.

The "Elsner" chemical equation is:



Cyanide is present as potassium, calcium or sodium cyanide and is essential to avoid gasification, because cyanide is highly toxic:  $\text{NC}^-(\text{aq}) + \text{H}^+(\text{aq}) \longleftrightarrow \text{HCN}(\text{g})$

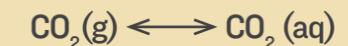
Therefore, it is necessary to maintain an alkaline pH throughout the process.

Calcium carbonates are added to keep alkaline water.

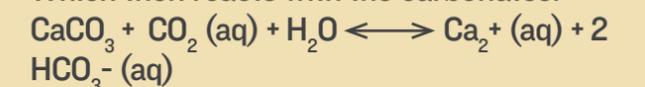
After the gold extraction, the "water process"

has to be neutralized before download to the environment.

Productos del Aire is making this neutralization applying gaseous carbon dioxide dissolved in the "water process":



Which then reacts with the carbonates:



And with water to create carbonic acid:



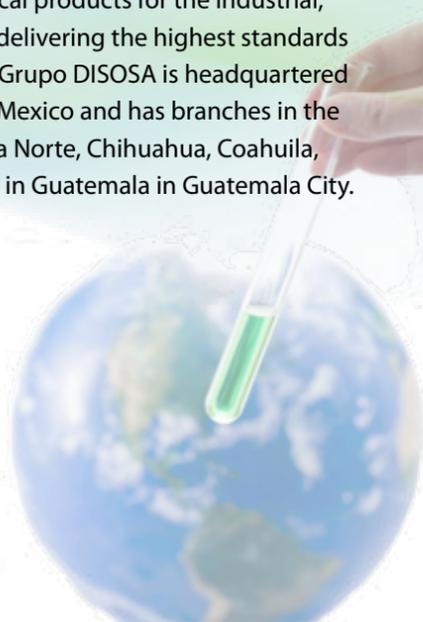
Therefore, a simple application of  $\text{CO}_2$  gas bubbling in "water process" makes the water pH initially alkalines by the carbonates that reach normal levels without complicated mixtures of chemicals in the water.

[www.productosdelaire.com](http://www.productosdelaire.com)



## Industrial, Mining & Food Industry

Since its formation in 1985, Grupo DISOSA has been dedicated towards the marketing of chemical products for the industrial, mining and food industry sectors, delivering the highest standards of products and quality of service. Grupo DISOSA is headquartered in the city of Guadalajara, Jalisco, Mexico and has branches in the Mexican states: of Baja California Norte, Chihuahua, Coahuila, Sonora, Zacatecas, Mexico City and in Guatemala in Guatemala City.






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The processing plant



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Sacos Agrindustriales

Another part of Marlin's internal structure is its Sustainable Development department. It is this area of the business which provides resources and funds for community development initiatives in communities near the operation and along the access road to the mine through its Organizational Development Unit.

Each project is designed, selected and implemented in conjunction with community

leaders and members. The Sierra Madre Foundation (SMF) is a Guatemalan foundation, funded by Goldcorp, which was formed in an effort to contribute to the development of neighbouring communities. Its mission is to assist with the planning and implementation of sustainable, community-based development and capacity building programs in San Miguel Ixtahuacán and Sipacapa.

**“SUCCESSFUL EXPLORATION ACTIVITIES IN THE AREA SURROUNDING THE PIT INDICATE THE POTENTIAL FOR EXTENDING THE LIFE OF THE MINE”**

**2,000 TONNES**

.....  
**Of ore produced by Marlin's underground operation every day**

In early 2012, open pit operations at Marlin ceased when the mining of the final, higher-grade portion of the pit was completed. Today the mine is an underground operation only. Underground operations at the site employ mechanised cut-and-fill and long hole stoping mining, with underground loading equipment feeding haul trucks that transport the ore to the surface via ramps. Production from underground operations is roughly 2,000 tonnes of ore per day. This ore is processed in a conventional crushing, grinding and milling circuit. Marlin also has a tailing storage facility, a waste rock storage area and various ancillary installations.

Despite open pit operations coming to an end, successful exploration activities in the area surrounding the pit indicate the potential for extending the life of the mine. The discovery of a bonanza grade vein, the Delmy vein, which is located near the Marlin deposit and within the existing mining area, will contribute significantly to the mine's future production. **BE**

For more information about  
Goldcorp - Marlin Mine visit:  
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Tilapia fish project



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