

ADVANCED MANAGEMENT TOOLS FOR THE LEACHING PROCESS

LEACHTROL
LEACHSENSE



INGENIERÍA DE PROCESOS DE LIXIVIACIÓN

Biohydro.cl

Cost effectiveness of keeping the leaching process under control.

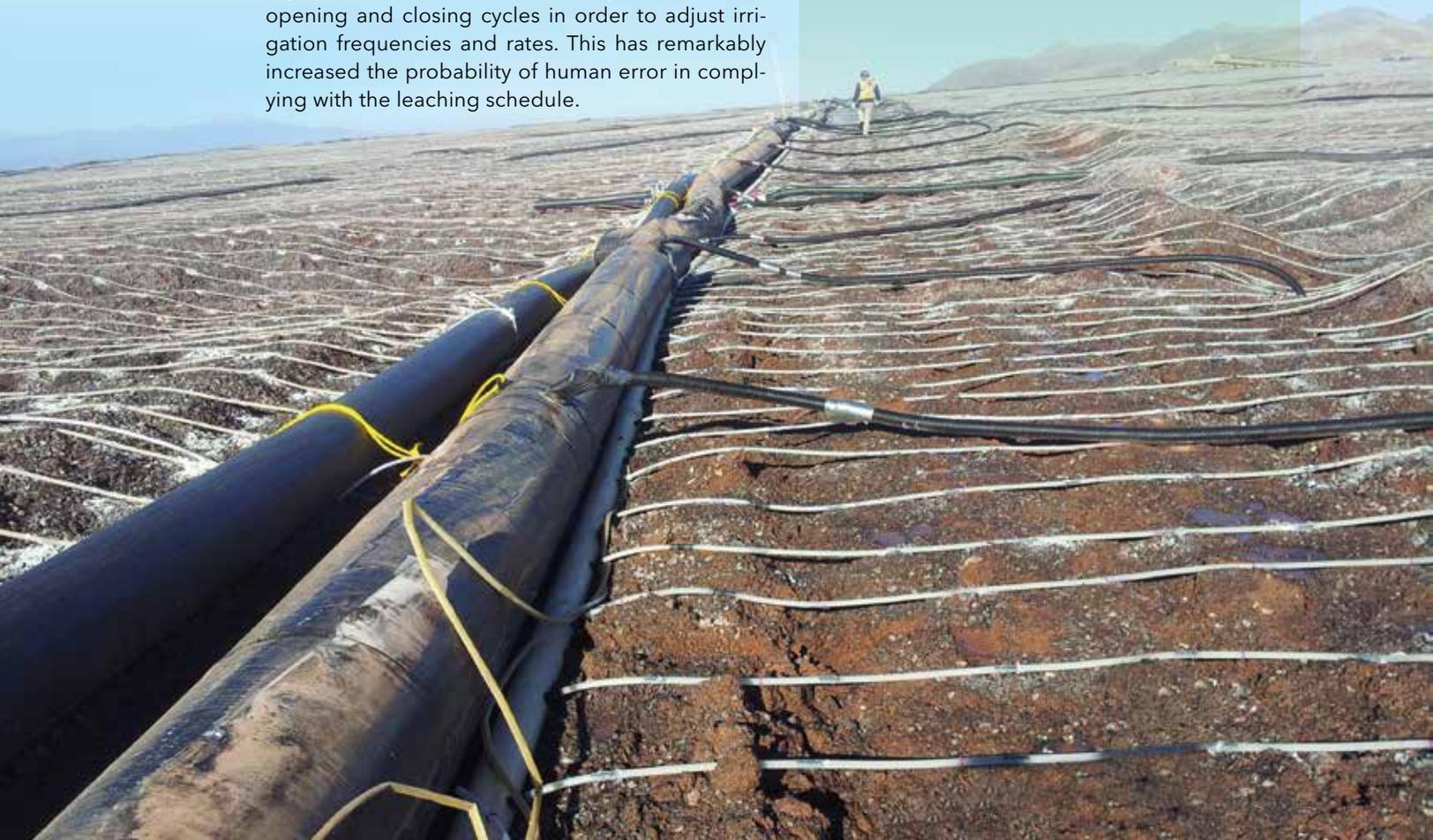
The leach pad is a vast area subdivided into cells that have traditionally been supervised by field operators in order to perform process control and monitoring.

Limited instrumentation is responsible for economic losses by preventing timely detection and response to operational issues.

Additionally, usually there aren't any reliable records or reports that enable adequate control and further analysis. Irrigation schedules have become highly sophisticated, thus requiring complex valve opening and closing cycles in order to adjust irrigation frequencies and rates. This has remarkably increased the probability of human error in complying with the leaching schedule.

Advantages

- Detecting malfunctions.
- Timely correcting deviations that have a negative impact on production.
- Ensuring irrigation schedule compliance.
- Reducing human error.
- Reliably managing large leach pad surfaces.
- Enabling complex irrigation strategies: On/Off, variable rates and frequencies.



RELIABLE CONTROL FOR YOUR PROCESS

LEACHSENSE

LEACHTROL

Biohydro.cl has successfully developed and implemented virtually maintenance-free automation solutions, especially designed for the demanding conditions of this process. Leachsense and Leachtrol management systems were developed to provide reliable systems for monitoring and recording leaching variables, and an intelligent and automated irrigation control in leaching cells, featuring remote operation of field valves to adjust irrigation rates, respectively.

Characteristics

The proven ruggedness of the components in our control systems ensures failure-free long lasting operation, allowing us to offer a 5-year warranty.*

- IP66 waterproof enclosures, resistant to corrosion, dust, solar radiation and rain.
- High performance sensors, built to manage aggressive fluids.
- Inert coating protection for electronics and connectors.
- Pressure regulation devices that do not use mechanical pilot valves.
- Base station with back-up workstation and UPS.
- Remote devices continue to operate on emergency irrigation cycle in the event of prolonged communication interruptions.

Support

Leachsense and Leachtrol systems feature installation, operation and maintenance manuals. Assistance and in-depth user training will be provided during system start up for those who are in charge of system supervision and operation. There are enough spare parts included in the spare-parts kit provided under warranty to last the entire guarantee period. Post-sale service offers: web-based software support, 24/7 technical support over E-mail with a 10-hour maximum response time limit, technical field support and phone support Monday through Friday 08:00 to 19:00 hrs. **



Documentation



Training



Remote assistance



Technical support

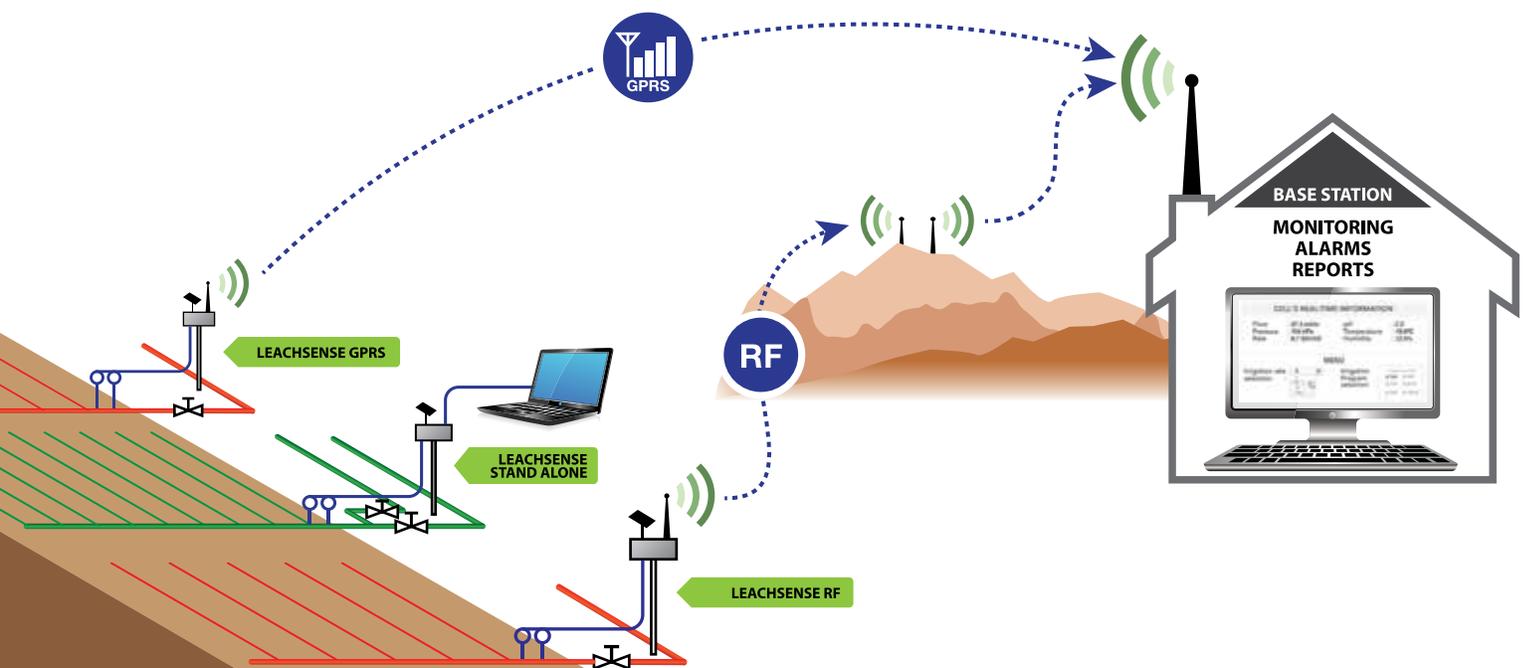
* See warranty protocol

** Continental Chile time

LEACHSENSE CONFIGURATION

STANDARD CONFIGURATION						
	Communication	Data display	Data Storage	Sensors	Remote valves actuation	Valve modulation
LEACHSENSE STAND ALONE	N/A	Local	Local	2	NO	N/A
LEACHSENSE GPRS	GPRS	Base Station	Data Base	2	NO	N/A
LEACHSENSE RF	RF	Base Station	Data Base	2	NO	N/A
LEAHTROL P	RF	Base Station	Data Base	1	YES	By Pressure
LEAHTROL C	RF	Base Station	Data Base	2	YES	By Irrigation Rate
LEAHTROL CA	RF	Base Station	Data Base	2	YES	By Irrigation Rate

LEACHSENSE Know in real time.

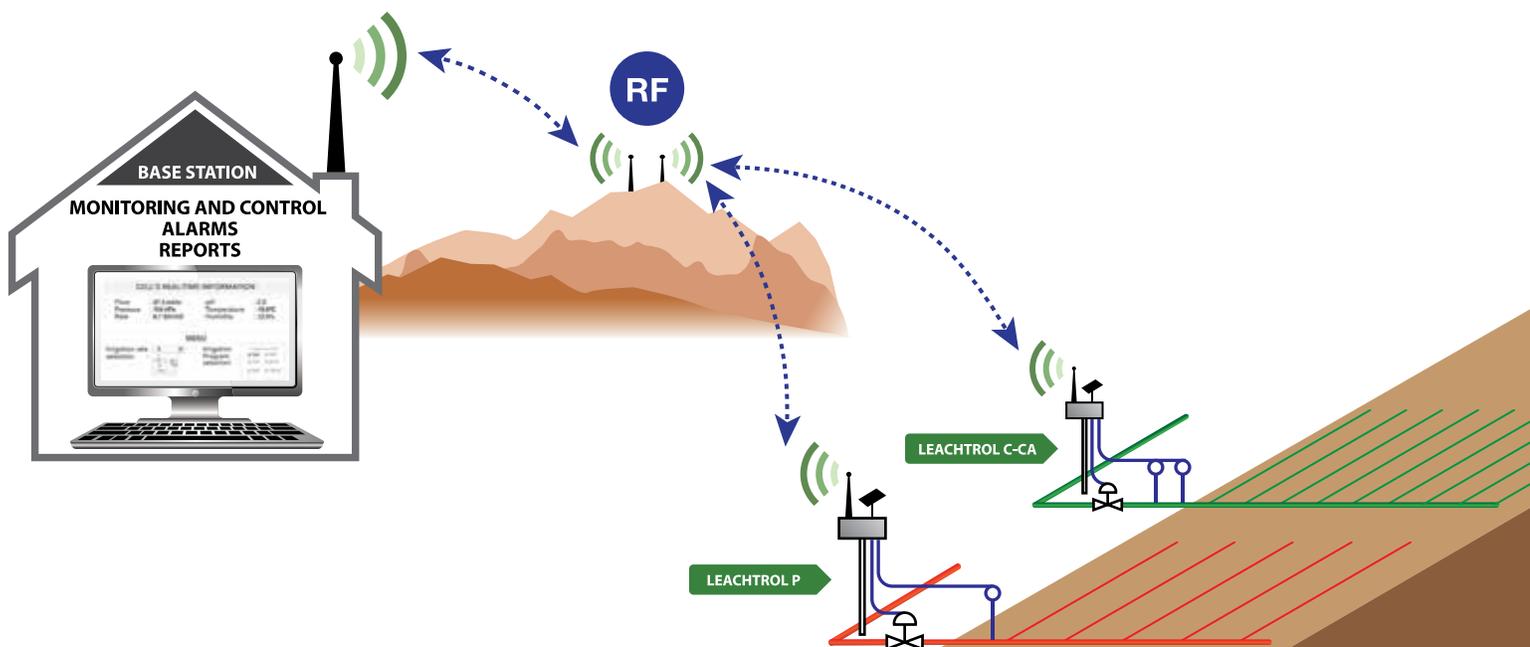


& LEACHTROL RATIONS

	OPTIONALS						
Irrigation rate vs pressure calibration	Reports	Data Bus connection	Additional sensors	Double irrigation circuit control	% of non irrigated area	Valve filter	Differential pressure filter monitoring
N/A	NO	NO	4	N/A	N/A	N/A	N/A
N/A	YES	YES	4	N/A	N/A	N/A	N/A
N/A	YES	YES	4	N/A	N/A	N/A	N/A
NO	YES	YES	*	YES	NO	YES	YES
Manual	YES	YES	*	YES	YES	YES	YES
Automatic	YES	YES	*	YES	YES	YES	YES

N/A= Does not apply * = According selected options

LEACHTROL Know and act in real time.



LEACHSENSE

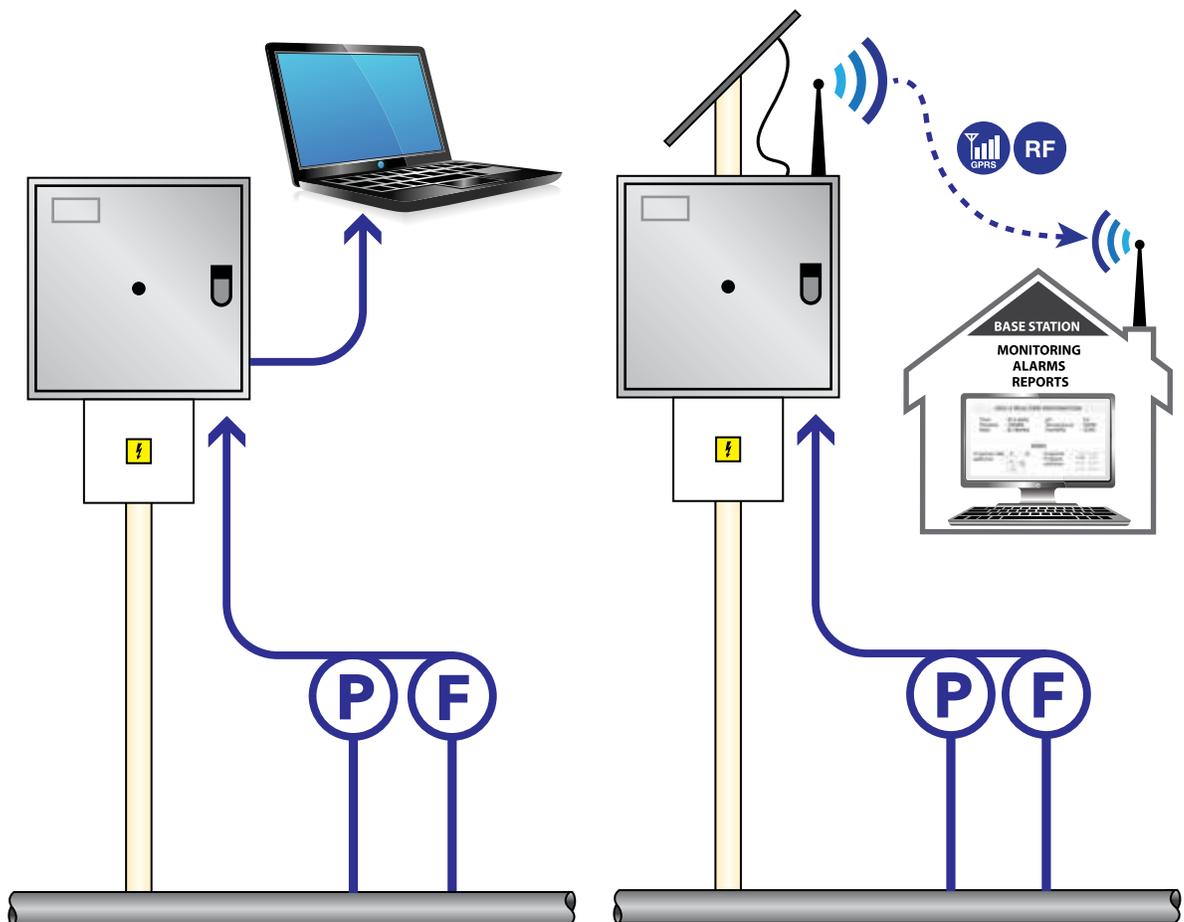
Leachsense systems have been designed to measure and record leach pad operating variables such as, pressure, flow, temperature, etc. Data can be stored locally or at the Base Station, depending on the version. Remote units feature back-up batteries and/or solar panels for energy autonomy.

Leachsense Stand Alone

Leachsense Stand Alone devices are capable of locally monitoring and recording a number of process variables. Data collected can be downloaded to a computer using a USB cable for convenient data management and analysis purposes. In its standard version Leachsense allows you to monitor two process variables with a single device. The system includes the option of having up to four additional sensors with a 4-20 mA standard signal.

Leachsense GPRS - RF

Leachsense GPRS and Leachsense RF devices feature wireless communication with a Base Station where data is stored and displayed. Receiving immediate information about process anomalies allows for timely correcting deviations that impact the operation's profitability. Reporting on historical records allows for optimized management control. In the former case communication is conducted via a GPRS public network and in the latter, on a local 900 MHz frequency.



LEACHTROL

In addition to the monitoring capabilities featured by Leachsense systems, Leachtrol adds valve actuation for irrigation on the leaching pad, thus allowing operators to address complex valve opening and closing valve cycles, which vary in duration and frequency, besides regulating the irrigation rates required. Leachtrol versions provide several features, ranging from a basic actuation capability to regulate inlet valve to the cell to monitoring and controlling dual circuit or dual solution irrigation systems. A detailed description of our dual mesh Leachtrol System may be downloaded from our website (www.biohydro.cl).

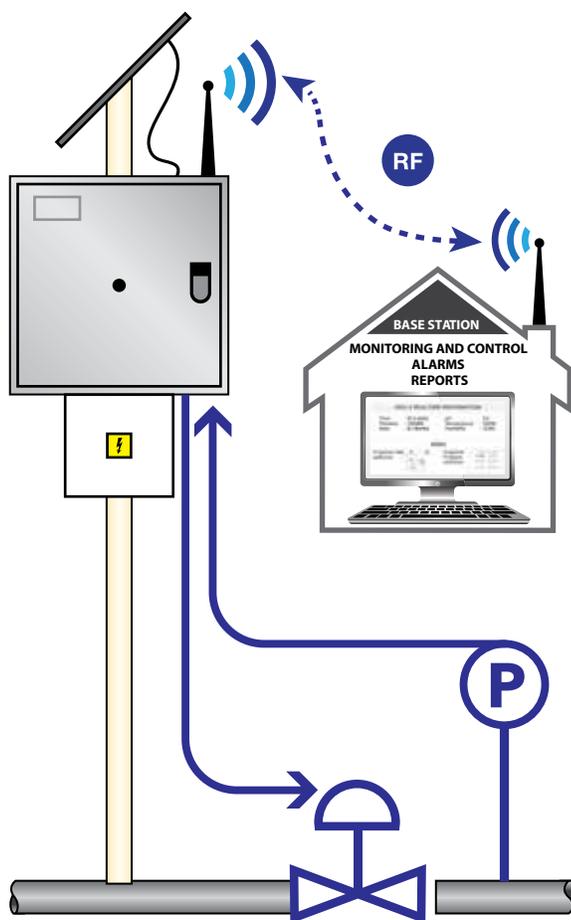
Leachtrol systems consist of three main components: the **Base Station**, which provides operators access to the HMI for scheduling, controlling and monitoring the irrigation system; the **Repeater Station**, which is a two-way data link over radiofrequency between the Base Station and the **Remote Devices**, which are self-sustainable energy-wise devices that execute the preset irrigation schedule, reporting operating conditions and parameters.

Its main features are as follows:

- Communication up to 10 km in the 900 MHz band.
- Monitoring and controlling up to 300 cells with latency less than one minute.
- Modulating pressure or irrigation rates of remote valves.
- Scheduling dates, times and irrigation rates.
- Real-time alarms and daily reports.
- Backups to protect database against data loss
- Communication by means of data buses in standard protocols.
- Equipment resistant to corrosion caused by acids and chlorides.
- Valve actuation protected by filters with saturation control by means of differential pressure

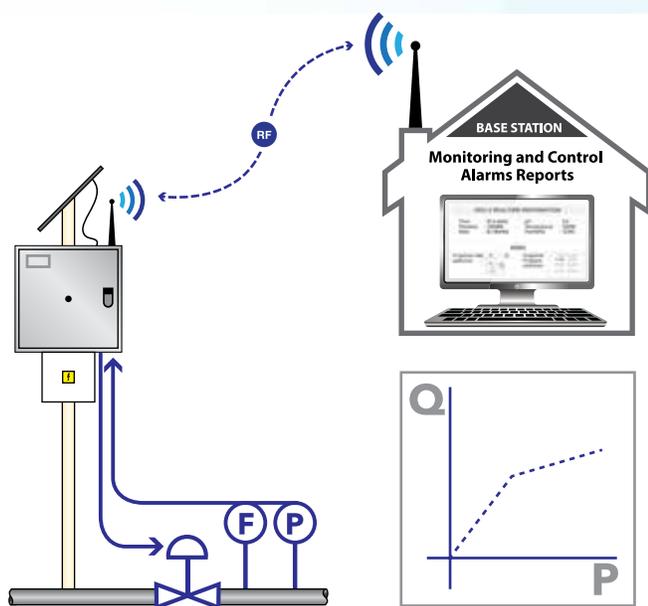
Leachtrol P

This device features remote actuation of inlet valves at the cells, modulating irrigation pressure. The easy-to-operate and user-friendly HMI interface, allows for irrigation cycle scheduling and on-line performance monitoring.



Leachtrol C y CA

These systems feature manual (C) or automatic (CA) calibration to detect the specific hydraulics of each cell. A flow rate/pressure curve is established for field conditions, allowing the operator to choose the most advisable irrigation rate available, once the calibration process is complete. Leachtrol C or CA will automatically set and adjust the required pressure to execute the chosen irrigation rate. If needed, calibration helps determine how much area has not been irrigated because of dripper clogging.



Leachtrol application

On a 144-cell leach pad, Leachtrol P made it possible to operate under a highly complex early wetting schedule of the cells. Under its most demanding operating conditions the system runs on 10-minute valve opening and closing periods, also allowing for user-defined irrigation rate adjustment, successfully leaching ores with very diverse percolation rates. See additional details on our website at www.biohydro.cl in the Downloads Section, Hydroprocess 2015 "Controlled Wetting: Key to Maintaining Leach Pad Permeability and Thus Ensure Production"



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