



STATEMENT OF QUALIFICATIONS

MINE MONITORING AND INSTRUMENTATION SERVICES



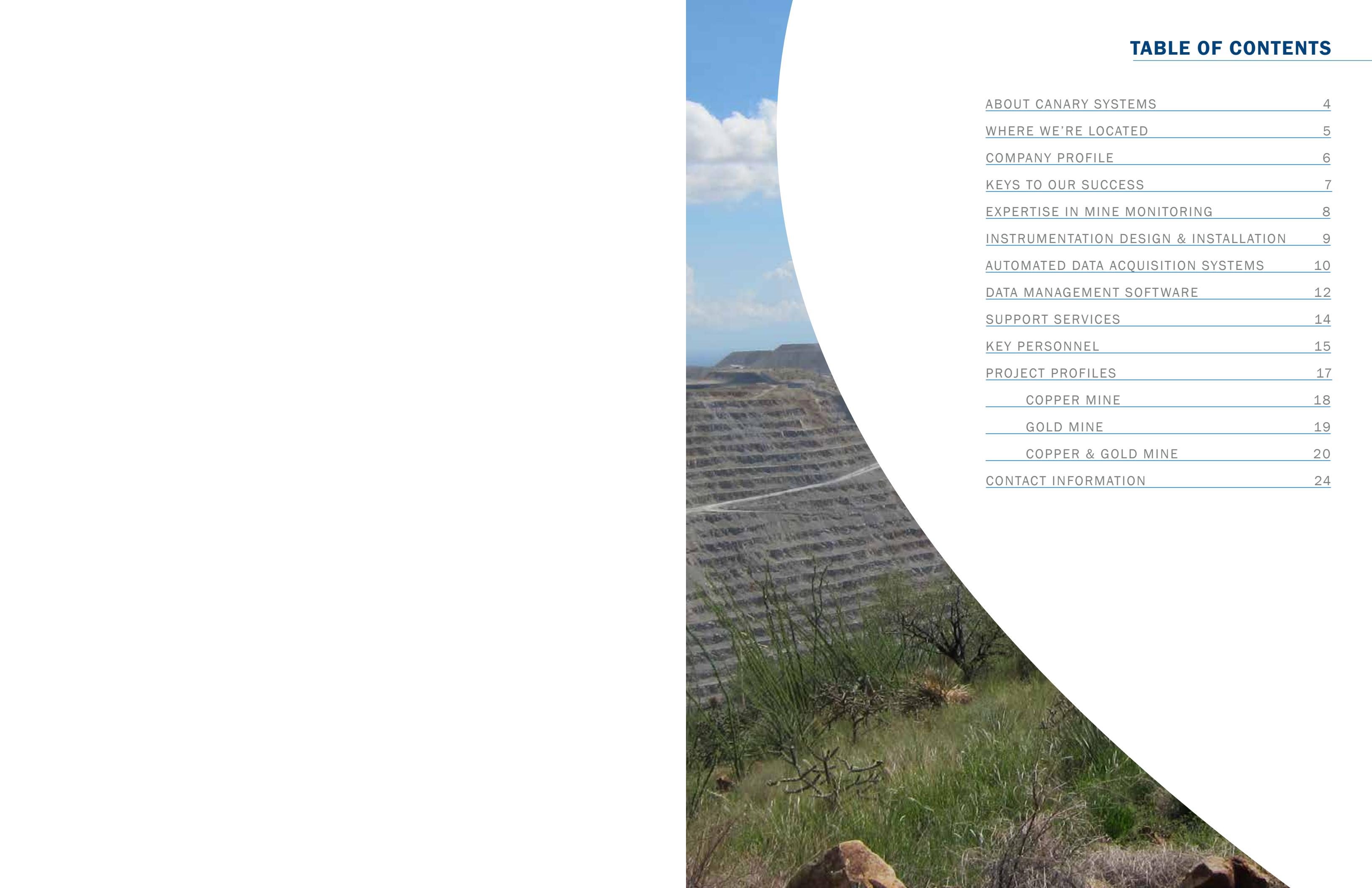


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ABOUT CANARY SYSTEMS

slope stability
hydrology
structural
environmental
seismicity

For over 20 years, Canary Systems® has been providing comprehensive instrumentation, hardware, and software solutions for monitoring mining structures such as large open pits, underground workings, tailings impoundments, and leach pads as well as dams, bridges, tunnels, utilities, embankments.

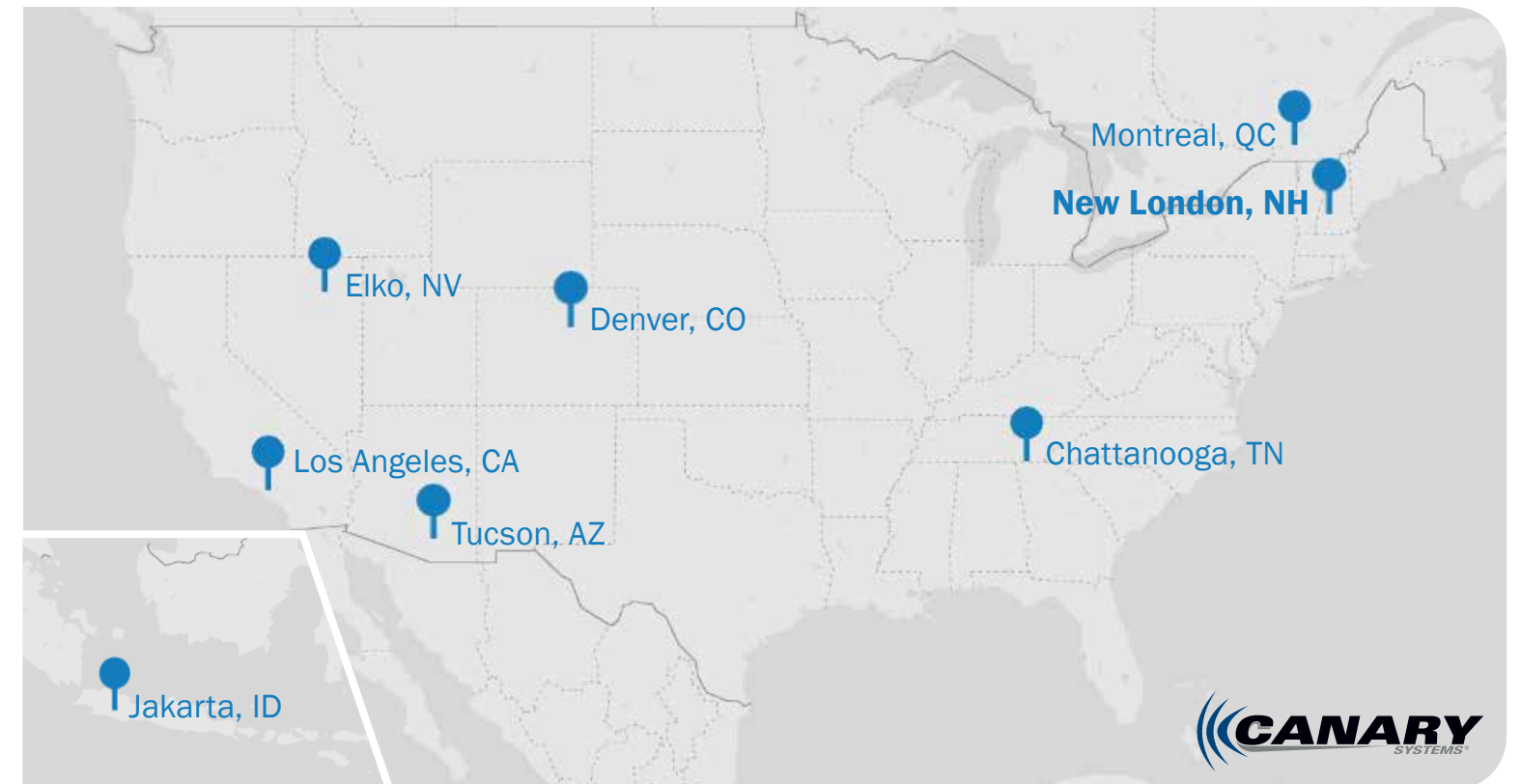
cost-effective
state-of-the-art
reliable

We have a proven track record of successful instrument installation and implementing cost-effective, reliable, state-of-the-art data collection and information systems for our clients. Our capabilities include instrumentation selection and installation, system architecture, hardware and software development, database development, web-based data access systems, and engineering services.

hardware
software
database

We are a team of flexible, accessible, and easy to work with professionals who are mindful of our client's best interests. Our knowledge of instrumentation and automated monitoring systems is unrivaled in the industry.

WHERE WE'RE LOCATED



LOCATIONS

New London, NH, USA
Chattanooga, TN, USA
Tucson, AZ, USA
Denver, CO, USA
Elko, NV, USA
Los Angeles, CA, USA

**Canary Systems
Canada, Inc.**
Montreal, Canada

**PT Canary
Systems Asia**
Jakarta, Indonesia



remote
automated
manual

GOAL

provide comprehensive solutions
for data acquisition applications

MANAGE RISK & INCREASE SAFETY

We help clients better manage risk and increase the safety of their operations by tying together all the loose ends: the hardware required for manual or automated data acquisition - and the software to collect, store, present and analyze data from multiple sources on a single integrated GIS enabled platform, in near real-time.

INNOVATION

There are many new innovative approaches to ADAS monitoring systems that we believe would benefit the industry immensely.

With the advancements in data acquisition and telemetry systems, a whole new paradigm is occurring in the industry allowing to integrate instrumentation data with other data sources to provide a cohesive data acquisition and analysis platform and geographic information system (GIS). Our team works at the fore-front of these new technologies and has the expertise to bring these state-of-the-art solutions to the industry.

INDUSTRIES

- mining
- dam safety
- infrastructure
- geotechnical
- structural
- environmental
- meteorological
- industrial

The success and value of modern ADAS systems is founded on a comprehensive design and implementation program that vertically integrates the following areas of expertise

- Geotechnical, Geology & Civil engineering
- Instrumentation design
- Electronics engineering
- System integration & telemetry design
- Data collection & data management
- Geographic Information Services | Computing management
- Applications Development
- Integration into existing workflows | support for existing systems



SOLID FOUNDATION IN

- instrumentation
- electronics
- telemetry
- data management
- application development

ENGINEERING EXPERTISE

- geotechnical
- geology
- structural
- electronics
- electrical

CANARY SYSTEMS TEAM

- well-rounded
- depth of resources
- focus on ADAS
- proven track record
- industry leading tools

INSTRUMENTATION & MONITORING

We have completed numerous instrumentation and monitoring projects on mines, buildings, and dams including monitoring earth embankments, large scale open pit mines, and mine tailings dams projects using a large variety of sensor technologies.

large open pits
underground
tailings impoundments
leach pads

Our success as a company is due to the diversity of expertise that we have on staff. Many areas of proficiency add to the overall success of our projects

- Geotechnical Instrumentation design and installation
- Project design, development, and management
- Sensor interfacing and integration
- Acquisition system hardware & component engineering
- System installation
- Software application and scripting development
- Computer networking and data telemetry
- Database administration
- Dedicated technical support personnel

REPRESENTATIVE CLIENTS

- Freeport McMoRan
- Rio Tinto
- Barrick
- China Molybdenum
- Tenke Fungurume
- Agnico Eagle
- Lundin Mining Corp
- Teck Resources
- Newmont Goldcorp
- Canada Natural Resources
- & many more

Canary Systems® is experienced in the design and installation of many types of geotechnical instrumentation. We have assembled a team of technical experts that are highly trained with many types of sensor technologies.

WE WORK ALONGSIDE THE CLIENTS

to make sure that all sensors are properly chosen and installed. This helps ensure that a properly working system is installed from the beginning. In addition, this has a high potential in saving the client and project money. We provide detailed construction drawings to document the installation of instrumentation including panel and wiring details for remote stations and surface finishing of instruments.

- Vibrating Wire Sensors
 - Piezometers
 - Crackmeters
 - Load Cells
 - Displacement Transducers
 - Strain Gages
 - Extensometers
 - Pressure Cells
 - Tiltmeters
- Time Domain Reflectometry (TDR) SAs
- MEMS Sensor
 - Tiltmeters
 - In-Place Inclinometers (IPI)
- SDI-12 Sensors
 - Bubblers
 - Pressure Transducers
- 4-20mA Sensors
 - Pressure Transducers
 - Load Pins
 - Flowmeters
- Voltage Sensors
 - Pressure Transducers
- Inclinometers
- Seismic Sensors
- Automated Total Stations
- GPS/GNSS stations and networks

PARTNERS IN INNOVATION

integrate systems of leading innovators always considering the newest innovator collaborations that will benefit the industry in-house product innovations and designs



AUTOMATED DATA ACQUISITION SYSTEMS

system design
production
QA/QC testing
maintenance

Canary Systems® recognizes that well designed ADAS begins with system criteria resulting from dam safety engineering analysis. We design and manufacture off-the-shelf monitoring systems for a wide variety of applications. Our systems include **MLDAQ**, **MLTDR**, **MCLOG**, and **MLGPS®** stations and portable devices. Additionally, several types of **WRMT** wireless remotes provide wireless monitoring expansion.

custom
integration

We also offer custom designs to meet any project needs or integrate or improve existing systems. For all custom designs, we work with the client through all phases of the project to meet desired objectives. All systems are built to withstand the rigors of operation in harsh environments and remote locations, and support different types of communication peripherals.

PERIPHERALS

MicroMux
MiniMux
MultiMux
VW Comm Module
VWDSP

We have developed several types of peripherals products. These include channel expansion products to expand system measurement capability between 4 and 48 channels, and several types of sensor interface products to read vibrating wire gages.

vendor neutral
system integration
assembly
testing
repair

SYSTEM PRODUCTION, ASSEMBLY, TESTING
Canary Systems® works alongside all leading innovators in the industry to integrate their systems. We have a fully equipped lab for system assembly, repair, production and testing of data acquisition systems and software. A variety of testing equipment is utilized to complete QA/QC checks on all component integrations and system builds. Canary Systems® continues to remain at the forefront of the state of the practice and is a known and recognized industry leader in ADAS technology.

POWER & CHARGING

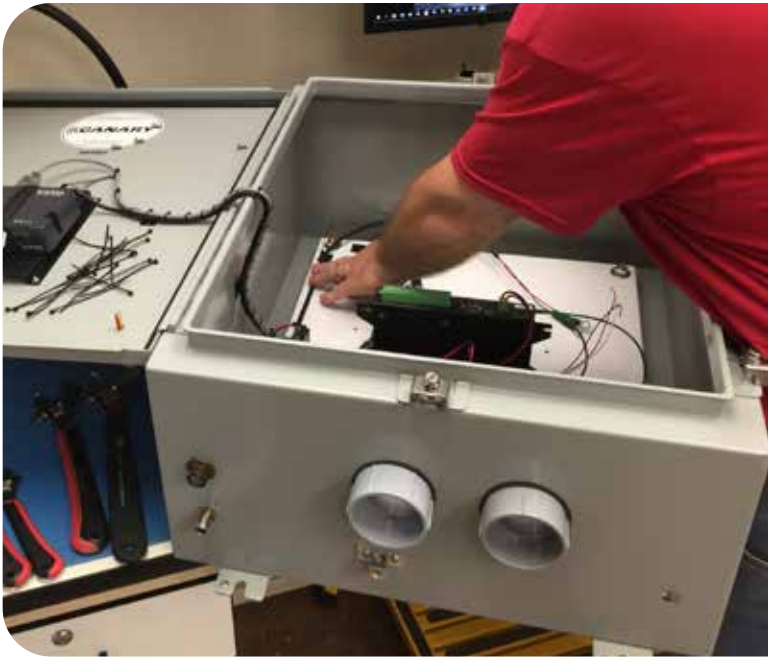
AC adapter
battery & solar
battery cells

COMMUNICATIONS

phone & cellular modems
RF modems
spread spectrum technology
Wi-Fi
short haul modems
satellite
fiber optic

FIELD INSTALLATION

nationwide & international
highly trained technicians



DATA MANAGEMENT SOFTWARE

MLSuite® is a leading data integration and management software platform developed in-house by Canary Systems®. It provides a simple web browser based point-and-click interface for manual and automated data collection. The software includes flexible tools for data imports and logger programming, complex alarming, charting and reporting, calculations and data validation, that allow translating raw data into visual **2D | 3D | GIS** decision making tools.

MLSuite® is a Windows based software package backed by SQL database technology. It is capable of full GIS map server integration and 3D visualization of structures and terrain to show instrument locations and data on site. It also offers complex alarming and notifications options, as well as flexible document management capabilities.

Management of large datasets
Digitize historical data
Supports many data types
Logger programming
Complex alarms and notifications
Automated reporting
Integrate georeferenced data
Python scripting and API
In-house server deployment
Hosted cloud deployment

MLSuite® provides the tools necessary to automate graphs and tables for proper performance evaluations and **Monitoring Reports**.

Statistical analysis of data ranges is easily performed to evaluate thresholds and trends. Over 20 chart types are supported including trendlines and flexible customization and aggregation tools. The calculation engine allows for conversion and interpretation of raw data.

All data may be validated with pre-selected tolerance ranges. Automatic status reports may be routinely sent to mine operations personnel to expedite reviews and help streamline operations..



MLWEB®

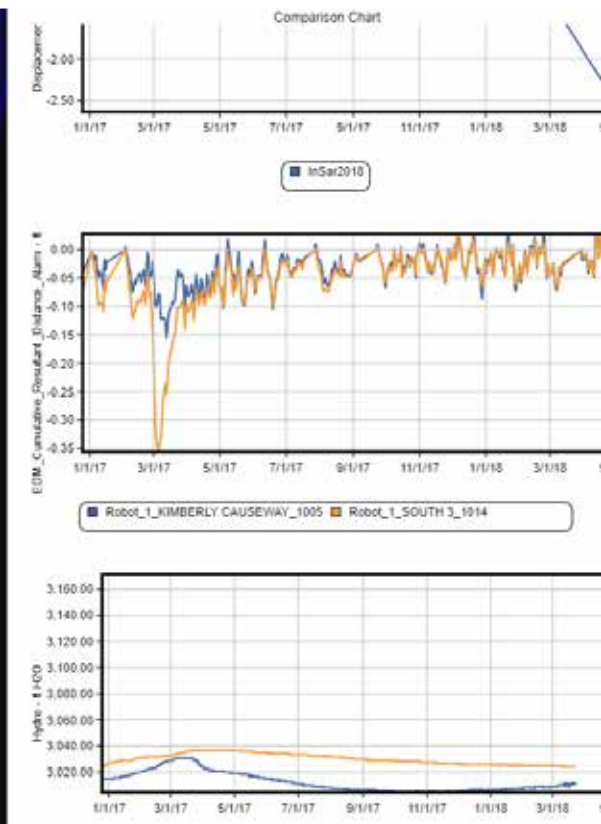
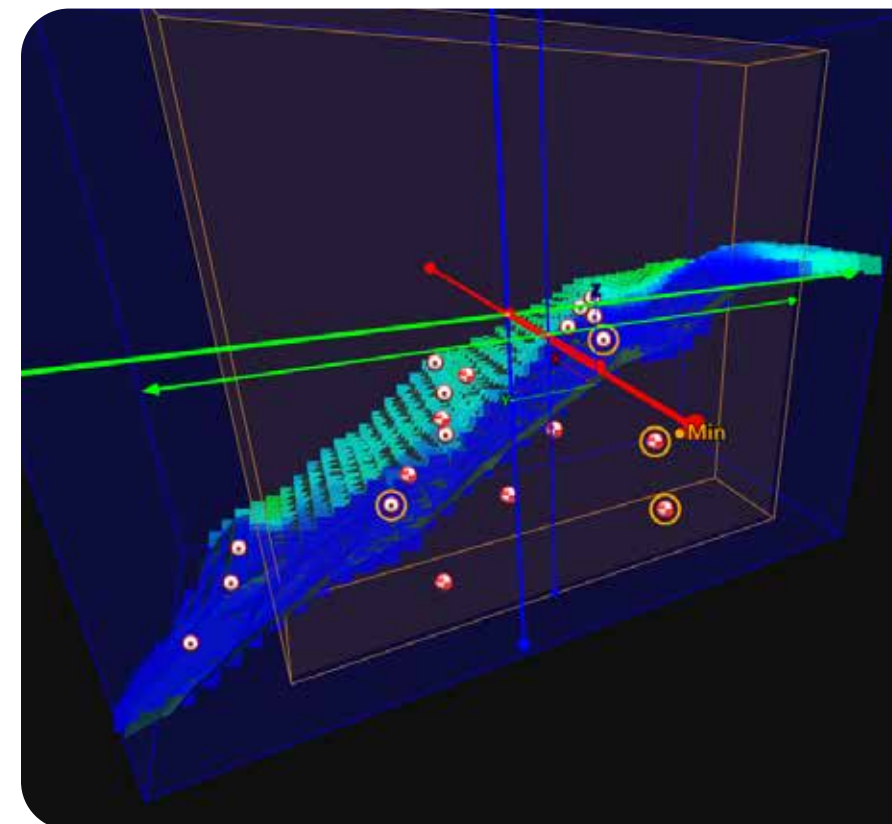
web browser access to project database
secure via intranet or Internet
a single integrated platform

Internet Information Services (IIS)
Proven security via Microsoft .NET

MLFIELD® APP

mobile app for Android™ & iOS
used during instrument survey
locate instruments in the field
integrated Google Maps™

station identification via QR codes
enter data, photos & visual observations
offline mode with synchronization into database



SUPPORT SERVICES

Canary Systems support packages are carefully designed to meet different levels of client requirements, project scopes and deployment sizes. They help maintain the reliability of your monitoring system, and increase and sustain its value, at a fraction of the original system deployment cost. Plans include priority support at discounted rates (or at no extra cost at the Gold level) without additional incident fees, free software upgrades, and free on-site days.

With several plan levels for support, you can easily find the right match for your facility. We are constantly working to expand our presence to better offer support to clients around the world through whatever means best suits their projects.

- Free software updates
- Data reliability
- Cost effective
- Worry-free hosting
- Training
- Project support

BRONZE LEVEL

troubleshooting for Canary Systems products
Installation of service packs and new releases

- phone
- email
- remote desktop
- free remote support
- annual inventory report
- hardware support
- free testing
- parts replacements
- battery replacements

SILVER LEVEL

active monitoring
quarterly status reports

GOLD LEVEL

proactive risk management
unlimited project support
monthly reporting

KEY PERSONNEL

Collectively, we have many decades of experience working directly with practically all types of instrumentation, data acquisition equipment, communications, and related hardware, as well designing data management systems and working with client's data. This provides us a unique perspective understanding all the issues related to monitoring systems and the methods of accessing and presenting data to maximize the value of the investment that our clients have made in their monitoring programs.

ALEX NEUWIRT

Founder and president of the company
25+ years of hardware and software development experience
Has developed many types of instrumentation programs
Specialty in software such as our MultiLogger software



TAYLOR DAWN

B.S. degree in Mining Engineering from the University of Arizona
Specialized in Mine Operations and Geomechanics
Worked in both surface mines and underground operations
Focus on stability and monitoring



WILL CONRAD

M.S. & B.S. in mining engineering from Virginia Tech
Micro-seismic instrumentation and monitoring
Geotechnical instrumentation including slope inclinometers & piezometers
Slope monitoring, slope stability analysis & rock mechanics



CECILIA ALLISON, PHD

M.S. in Physics and a Ph.D. in Geophysics from the University of Texas
Experience in rock mechanics, fault motion and numerical forward modeling
Analysis of acoustic measurements to obtain mechanical rock properties and stress distributions in borehole vicinities



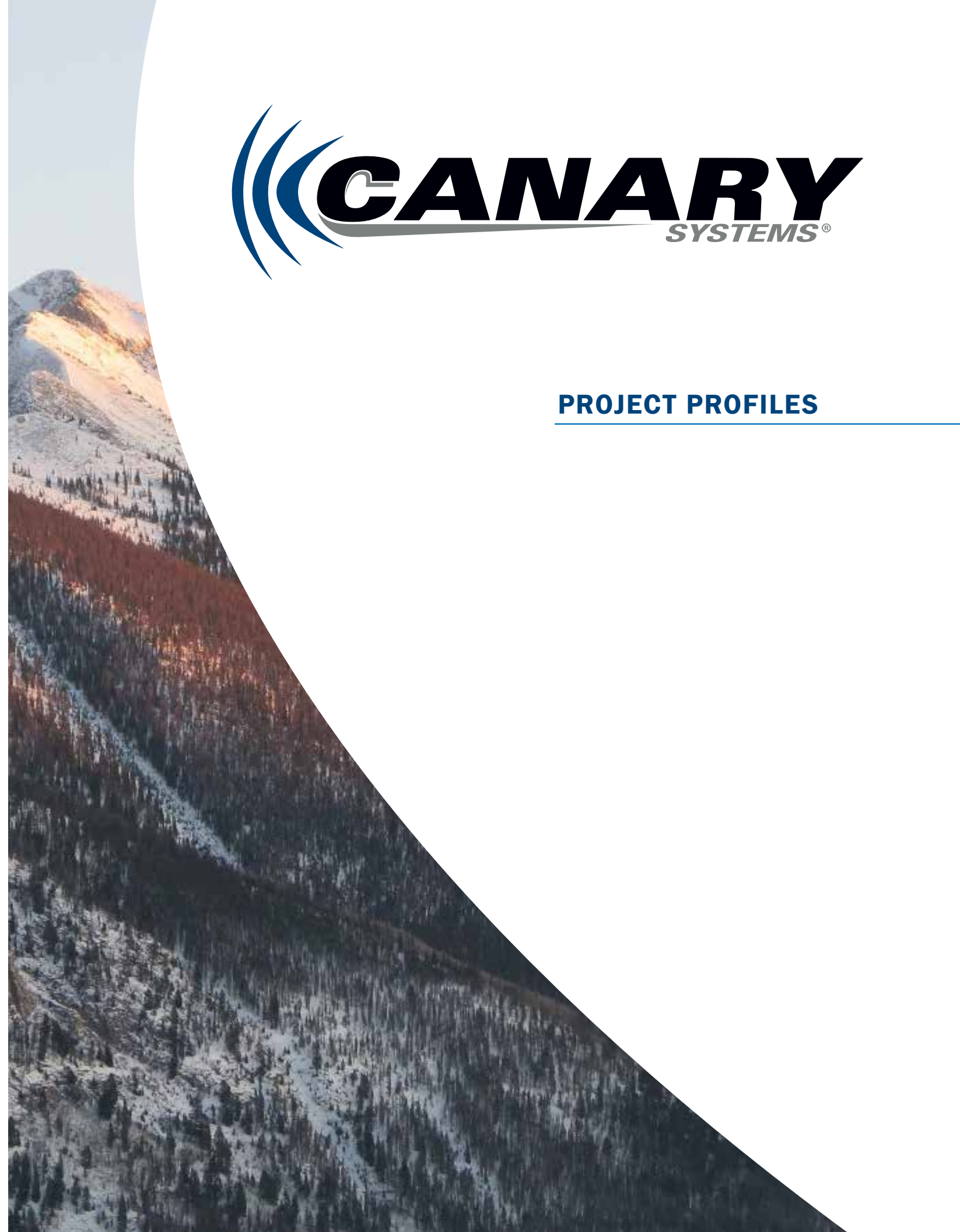
ALEKSEY SUVOROV

19 years experience in software development
Master's in Management & Information in Technical Systems
Analysis, design, testing & implementation of Windows & web based software
Software architectural design, system integration & database design





PROJECT PROFILES



COPPER MINE

ARIZONA, USA

Integrated into the MLSuite platform at a copper operation in Arizona is data from the site's seven pits, two leach pads, and tailings facilities. Canary Systems has provided the data management platform, as well as all field hardware for the site's piezometers, TDR cables, and weather stations for over 10 years. Canary has also been the source of the site's instrumentation, including the piezometers and TDR cable. For services, Canary assists the site in deployment of instrumentation and hardware, setup and maintenance for its three databases, in-person and remote training, and data presentation.

INTEGRATED DATA SOURCES

- 1584 Prisms
- 1004 Piezometers
- 55 TDR cables
- 16 Seismic recorders
- 2 Weather stations
- 2 Tensiometers

GOLD MINE

NEVADA, USA

The integrated MLSuite monitoring platform at a gold mine in Nevada includes data from the site's 3 open pits, underground workings, and leach pad. Canary Systems has provided the software for the site personnel to manage their geotechnical data, as well as hardware solutions for the leach pad piezometers, wireline extensometers, in-pit MPBX, tilt beams, and TDR cables. Through the site's Gold level support, Canary assists with database setup and maintenance, continual training, troubleshooting, configuring imports, data presentation, and alarms and notifications.

INTEGRATED DATA SOURCES

- 890 Piezometers
- 584 Prisms
- 3 Wireline extensometers
- 2 Tilt beams
- 37 MPBX (in-pit and underground)
- 3 TDR cables
- 12 GPS
- InSAR
- Pump rates
- Planned hydrology goals





COPPER & GOLD MINE

PAPUA, INDONESIA

The MLSuite system at one of our clients in Indonesia includes data from the site's open pit, multiple underground workings, and civil infrastructure in one database. Canary Systems has provided the site's integrated software solution, instrumentation design support, as well as monitoring station hardware for the automated systems.

Canary has two dedicated full-time staffers that assist with database setup and maintenance, troubleshooting issues, writing standard operating procedures, in-person and remote training, reviewing data collection and validity, and creating charts, views, reports, alarms, and notifications.

INTEGRATED DATA SOURCES

- 3605 Manual convergence locations
- 1646 RTS prisms
- 388 Piezometers
- 375 GPS stations
- 1156 MPBX
- 18 Flume locations
- 27 Meteorological stations
- 19 river level monitors
- 204 TDR cables
- 16 tilt meters
- 24 inclinometers
- 25 Wire Extensometers
- 10 Rock Fence Sensors
- 12 Crackmeters
- Bi-weekly InSAR point clouds
- Damage mapping
- Wet muck events
- Water quality
- Microseismic event locations
- 199 System Health Parameters



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