

DICKSON **insights**

HOT **OR** **NOT**

MAPPING REVEALS ALL

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PLUS: Introducing the Legacy Uploader • **Validation Services** • 2017 Tradeshow

MERCURY RISING

TEMPERATURE'S IMPACT IS ALL AROUND US

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JEFF RENOE • INSIGHTS EDITOR-IN-CHIEF

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Feature Story

Fired Up

I believe that I can properly guess one thing that is impacting everyone reading this right now. The ambient temperature around your body is affecting your comfort. Obviously, this is more than just a wild guess. Too put it in Star Wars terms, temperature is like the Force. It's always all around us.

Temperature impacts our days. It impacts how well we're able to do our jobs. It impacts the food we eat and the health we maintain. It's why monitoring temperature at work, at home, and in the environment is important for a seemingly infinite amount of applications.

In the pages that follow you'll learn about three different ways temperature around us is measured, why it matters, and how the measuring is done.

Thanks for reading, and I hope you enjoy the September issue of Dickson Insights.

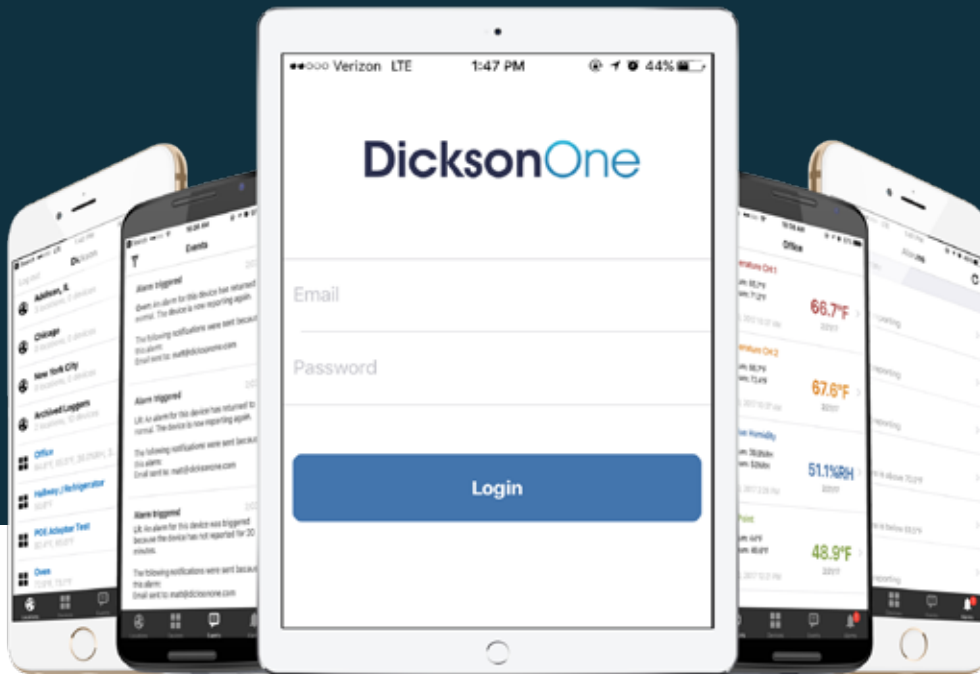


DSB

The newest member of the Dickson family.

Read more on page 18.

MILLIONS OF DATA POINTS RIGHT IN YOUR POCKET



**We know you're always on the move.
So we made sure your data could be, too.**

With the DicksonOne mobile app you can instantly access all
your data and location information in the cloud.

Anywhere. Anytime.



PAST THE POINT OF MELTING

Bringing the heat is good for baseball, but not good for freezers.

That's what the University of Alberta learned in April when 12 percent of their Canadian Arctic ice core samples melted in malfunctioning cold storage.

Unfortunately, their freezer soared to 40°C over a weekend when the freezer malfunctioned and the accompanying monitoring system failed due to a computer glitch. Losing samples is always hard to take, but what the University lost was more than a few years of work.

"When you lose part of an ice core, you lose part of the record of past climates, past environments," said Glaciologist Martin Sharp. "You just don't have easy access to information about those past time periods."

An ice core sample is essentially a piece of ice that's taken and tagged by drilling meters below the surface

in circumpolar regions. The samples contained in Alberta represent more than 80,000 years of climate change, and a few samples can be dated as far back as the last ice age. According to Science magazine, these cores make up some of the oldest records of climate change in Canada's far north.

"Among the losses: some of the oldest ice cores from Mount Logan, a 5595-meter-high mountain in northern Canada. Scientists also lost 66 meters of core from Baffin Island's Penny Ice Cap, which accounts for 22,000 years—a quarter of the record."

Luckily, none of the cores were completely destroyed, but that doesn't mean severe damage wasn't done. According to Sharp the samples can be contaminated by melted water from nearby samples. This makes them all nearly impossible to analyze.

"Not all research we do involves analysis of entire cores," Sharp said. "We may have to reconsider some of

the work we planned to do, but the work can and will continue — and nearly 90 per cent of the archive is still intact."

It's good to hear that all of this historical data wasn't lost, but it could have been. We talk a lot about science and technology here, but temperature and humidity are the reasons we exist. We work to simplify monitoring to make it as painless for our customers as we can. With products like DicksonOne that send out real time alerts via text, email, or phone calls whenever a logger isn't reporting, it's possible that a situation like this could have been avoided. In the end, that's why we're here. We want to make sure the heat's only on when you're bringing it, and do all we can to ensure none of it is on you.

Have something personal you'd like to add to the conversation? Send your thoughts to jeff@dicksondata.com for a chance to be featured in a future blog or article in our magazine.

WELCOME TO THE CLOUD

DATA AT YOUR FINGERTIPS. ANYTIME. ANYWHERE.



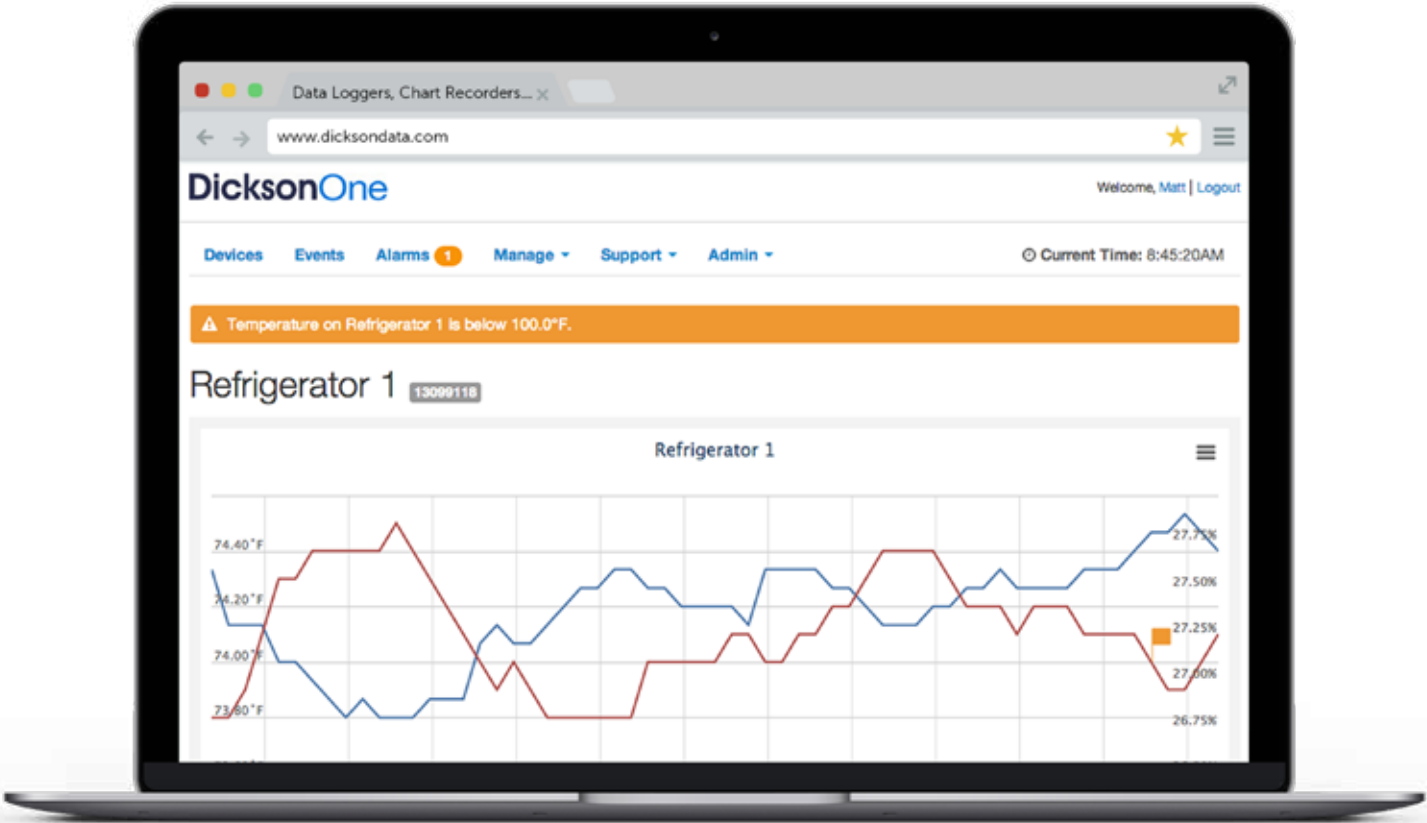
DicksonOne



TAKE
POWER
OVER YOUR ENVIRONMENT

We've re-thought temperature and humidity monitoring making it easier, scaleable, and cost effective.
Your data. How you want it. When you want it.





Secure

We utilize bank-grade security and Amazon Web Services for unparalleled reliability.



Anywhere

Wherever you are, access your data anywhere, anytime, 24/7.



Infinite

Securely store all your data in the cloud, whether you're recording for days, months, or years.



Automated

Devices send all collected data to the DicksonOne servers automatically, so you don't have to.



On Your Time

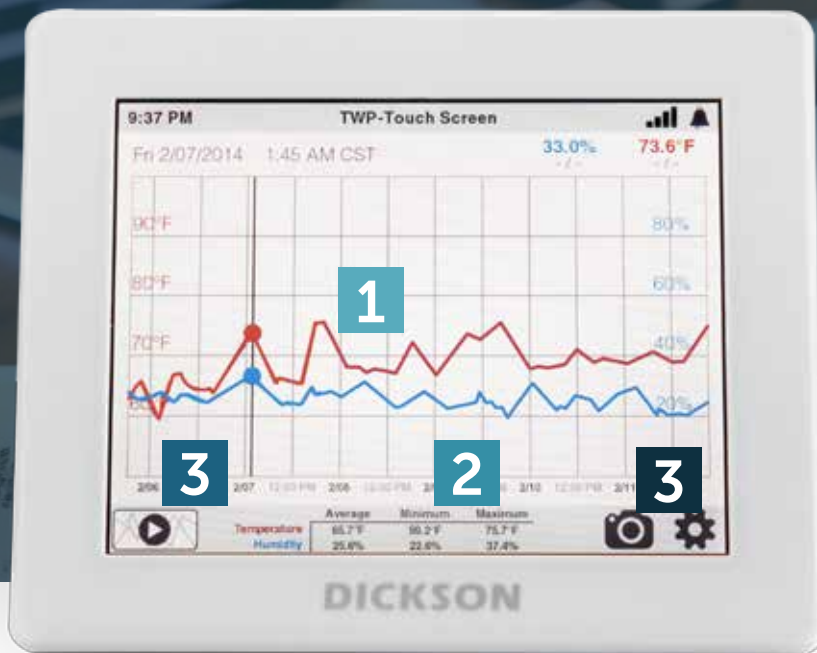
Create customizable reports delivered exactly when you want them.



Immediate

Receive real-time email, text, or phone call alarms when excursions occur.

Stay Connected. **Wherever You Are.**



01

THE GRAPH

We updated the user-interface, and made it easy to view and manage your data.

02

YOUR CHANNELS

The touchscreen automatically calculates and updates summary data for the selected time range.

03

MONITORING

Pushing the play button brings you back to the most recent readings, updating the view in real-time.

04

SETTINGS

Easily adjust sample rates, set alarms, and connect to DicksonOne.

The Touchscreen

The Touchscreen gives you the option to connect directly to DicksonOne. You get all of your data at your fingertips, and now you can access it anywhere too. Just connect your device to your local WiFi network or plug it into an Ethernet port, log into DicksonOne, and boom, complete data control.



DicksonOne Enabled • Capacitive LCD Touchscreen
Replaceable Sensors • WiFi, Ethernet, and USB Connectivity

Email us at support@dicksonone.com | Talk to a specialist at 630-563-4207

DicksonOne Touchscreen

MODEL	REMOTE PROBE	PRICE
TSB	USB Download	\$424
TWE	DicksonOne Wifi/Ethernet Connection and Download	\$524
TWP	DicksonOne Download and Power over Ethernet	\$599



DicksonOne Display Logger

MODEL	REMOTE PROBE	PRICE
DWE	DicksonOne Wifi/Ethernet Connection and Download	Starting at \$350



DicksonOne Software

One of the most common pain points when discussing monitoring is the retrieval of data. DicksonOne loggers send data to the cloud automatically, freeing up resources to do what they do best.

Talk to a specialist now | 630-563-4207

Per device billing
now available!

\$3

per device, per month
requires a credit card

BASIC

\$0

Unlimited Devices
Data stored for 30 days
1 hour sample interval

STARTER

\$300

1-10 Devices
Data stored for life of account
Multiple sample rates
Email, Phone, & Text Alerts
API Access

REGULAR

\$725

11-25 Devices
Data stored for life of account
Multiple sample rates
Email, Phone, & Text Alerts
API Access

PLUS

\$1,400

26-50 Devices
Data stored for life of account
Multiple sample rates
Email, Phone, & Text Alerts
API Access

ENTERPRISE

Call for Quote

51+ Devices
Data stored for life of account
Multiple sample rates
Email, Phone, & Text Alerts
API Access

HOT OR NOT

MAPPING REVEALS ALL

Heating a house is costly. Heating a hospital is even more so. Thanks to ideas by VTT Technical Research Centre of Finland, the costs of heating and cooling may one day drastically dissipate.

According to VTT, that can be made possible through concepts for adjusting spaces to individual needs. In other words, heat rooms that need to be heated, and save energy in rooms where they don't. It's a good idea but not an altogether novel one.

VTT is essentially discussing temperature mapping and making real time adjustments to where HVAC systems are in use. We discussed an idea similar to this last year when we talked about the value of a good night's sleep. In that piece we

discussed how temperature had a greater impact on your ability to sleep than light. That's a costly proposition for large scale facilities like hospitals.

We looked at using real time temperature monitoring as a way to save money on inflated costs. That'll be needed, because based on the estimates we put together in that article, it would cost hospitals nearly \$350,000 of incremental costs to drop the facility's temperature low enough to provide patients with a good night's sleep.

"If all things were equal, such a change (from 72° to 65°) would cost (a) facility an additional \$400,000 in cooling costs. After about \$50,000 in savings on the heating bill, the hospital could net out at a \$350,000 increase in annual operating expenses."

Another problem with adjusting spaces to an individual's needs is that everyone perceives temperature

differently. This, too, is a topic we've discussed.

"The makeup of the human body is important to how a temperature feels to you. Your size, gender and even metabolic rate can affect how you respond to it. A lower resting metabolism means women chill easier than men. Their higher levels of estrogen also amplify their blood vessels' response to cold. These kinds of factors don't always influence how someone perceives varying temperatures, however they can explain why two people sitting next to each other can feel differently about them."

The final question would be, which point(s) of the room are you monitoring your temperature against? As a company that actively maps rooms, chambers, cold storage and facilities, we understand how complex it can be to answer these questions.

TEMPERATURE MAPPING EXPERTS

Let Your Compass Lead the Way

We've mapped the temperature and humidity of numerous spaces for a wide variety of customers, but there are three that they look to us for more than any other.



WAREHOUSE MAPPING

Knowing the pain points now can mean less pain later in the form of spoiled product and failed audits.



COLD STORAGE MAPPING

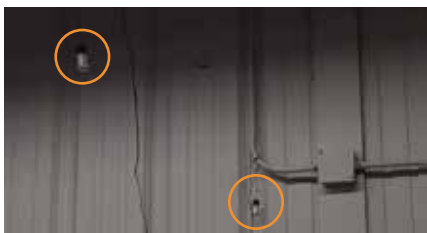
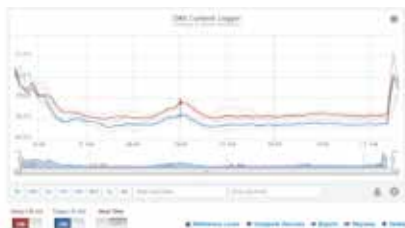
Are you confident that your cooling unit has fully mitigated your risk of audit failure?



CHAMBER MAPPING

Understanding the exact environmental conditions of any experiment is critical to ensure repetition and accuracy.

Last year we ran an experiment that showed how two probes as little as six feet apart could have drastically different readings. Below is an image from a DicksonOne account that shows the data, and an image of the probes hanging suspended in our warehouse.



If the temperature of our warehouse can have a one degree difference in an ambient setting then imagine how much of a difference could be had at opposite ends of the facility, near a window draped in sunlight, or by an HVAC register. That means the system will likely need real time monitoring across a number of points throughout a complex, and it often means you need to do some research. That research is called mapping.

Temperature mapping data is invaluable but can be a daunting task on your to do list. We know, we've crossed it off a lot of them. The process of mapping collects continuous monitoring at a number of set points throughout a facility. By analyzing this data you can understand the hot or cold spots that exist throughout a given structure. This kind of process would most

likely be required for VTT to properly achieve their goal.

While we can't promise to have the opportunity to help VTT with their mapping needs, we have helped many businesses around the country remain fully compliant in audits while streamlining their business operations and protecting sensitive products. If you have any interest in learning more about mapping visit DicksonData.com/Mapping or call one of our experts at 630-563-4207 today.

Have something personal you'd like to add to the conversation? Send your thoughts to jeff@dicksondata.com for a chance to be featured in a future blog or article in our magazine.

SETTING THE STANDARD

Calibration Services

Calibrations are essential to all devices that measure a variable. However, we often get the questions, “Why isn’t it accurate already?” and “Isn’t it made to be accurate?” The answers are: it is, and yes. However, while our devices are accurate without calibrations, we can’t be positive they are accurate to a specific measurable degree (and thus can’t prove their accuracy) unless we perform a calibration.

HOW CALIBRATION WORKS

STEP ONE

We compare your sensor with a standard sensor in a stable environment across a range of temperature readings.

STEP TWO

If there are any differences between the sensor and the standard, we adjust the sensor to align with the standard.

STEP THREE

We run through this process multiple times, adjusting the device as it is compared at multiple temperatures.

STEP FOUR

We perform a final check of one or more points, depending on the order, and create the necessary calibration certificate.

CALIBRATION OPTIONS

What works for my company?

1-POINT NIST

- One specific temperature point calibration
- Good if your temperature varies little
- Choice to specify the temperature point to best reflect your application

3-POINT NIST

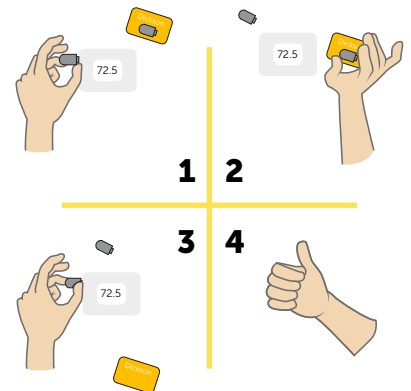
- Three-point (high, middle, and low) temperature point calibration
- Grants a larger proof of accuracy
- Choice to specify the temperature point to best reflect your application

Need help? Let us be your calibration expert. | 630-563-4207 | support@dicksondata.com

CONVENIENCE IS KEY

ALL YOUR CALIBRATION DATA RIGHT ON THE SENSOR.

Now, you have the option to calibrate the sensor as opposed to the unit. Think of it like this: the Replaceable Sensor takes an environmental reading, and the data logger or chart recorder records that environmental reading. By splitting up the sensor from the data logger and chart recorder, we've created a plug and play device, that will keep you in compliance, but save you time and resources.



ZERO DOWN TIME



All Dickson sensors come pre-calibrated with upgrade and certificate options.

FAST & EFFICIENT



Pull the old sensor off.
Put the new sensor on.
It's that simple.

COST-EFFECTIVE



Back up units are no longer needed. Pay for a sensor, not an extra device.

CHART RECORDERS

Want a physical readout right where you are monitoring? Our Chart Recorders have you covered. For ninety years we’ve built the best chart recorders in the business. Check out our models below.

8 and 6 Inch Models

MODEL	FEATURES	STARTING PRICE
KT6	6 Inch Temperature	\$384
KT8	8 Inch Temperature	\$436
TH6	6 Inch Temperature and Humidity	\$509
TH8	8 Inch Temperature and Humidity	\$509



4 and 3 Inch Models

MODEL	FEATURES	STARTING PRICE
SL4350	4 Inch Temperature	\$249
SL4100	4 Inch Temperature	\$249
SC367	3 Inch Temperature	\$249



DATA LOGGERS

For data loggers, information (temperature/humidity measurement and date and time) is stored as information. That data is stored in the device for later download (via software) onto a computer, or sent to a cloud application or server for remote access.

Compact

SP125 ————— \$119

Temperature Logger
Accuracy: $\pm 1.2^{\circ}\text{F}$, $\pm .7^{\circ}\text{C}$
Range: -10°F to 176°F , -23°C to 80°C

TP125 ————— \$199

Temperature & Humidity Logger
Accuracy: $\pm 0.8^{\circ}\text{F}$, $\pm .44^{\circ}\text{C}$
Range: -10°F to 176°F , -23°C to 80°C
Humidity: $\pm 2\%$ RH from 0 to 60%; $\pm 3\%$ RH from 60 to 95%

SK550 ————— \$699

Temperature Logger Pack of 12
Accuracy: $\pm 1.8^{\circ}\text{F}$, $\pm 1^{\circ}\text{C}$
Range: -4°F to 158°F , -20°C to 70°C

TK550 ————— \$999

Temperature & Humidity Logger Pack of 12
Accuracy: $\pm 1.8^{\circ}\text{F}$, $\pm 1^{\circ}\text{C}$
Range: -4°F to 158°F , -20°C to 70°C
Humidity: $\pm 2\%$ RH from 0 to 60%; $\pm 3\%$ RH from 60 to 95%

Display

SP425 ————— \$159

Data Logger with Large Display
Accuracy: $\pm 1.2^{\circ}\text{F}$, $\pm .7^{\circ}\text{C}$
Range: Range: -4°F to 158°F , -20°C to 70°C

TP425 ————— \$249

Temperature & Humidity
Accuracy: $\pm 0.8^{\circ}\text{F}$, $\pm .44^{\circ}\text{C}$
Range: -4°F to 158°F , -20°C to 70°C
Humidity: $\pm 2\%$ RH from 0 to 60%; $\pm 3\%$ RH from 60 to 95%



High Temp Solutions

INDICATORS

HT300 Waterproof, High Temperature Data Logger ——— \$349

HACCP and FDA Compliant. USB Download. IP68 Rating.
Temperature Range: -40°F to 257°F , -40°C to 125°C
1 & 3 Point Calibration options available.

HT350 High Temperature Process Logger ——— \$349

HACCP Compliant. K-Thermocouple Probe, USB Download, and a large temperature range.
Temperature Range: -40 to 257°F (-40 to 125°C)
1 & 3 Point Calibration options available.

Instant Data Solutions

INDICATORS

TC700 Touchscreen Handheld Indicator ——— \$299

Instant temperature data.
No-slip silicone cover. Battery powered.
Temperature Range: -200 to 1999°F , (-128 to 1093°C)

TH700 Touchscreen Handheld Indicator ——— \$299

Instant temperature/humidity data.
No-slip silicone cover. Battery powered.
Temperature Range: -40 to 185°F , (-40 to 85°C)
Humidity Range: 0 to 95% RH (non-condensing)

SOLUTIONS TO SUIT YOU

VALIDATION SERVICES

IQ

INSTALLATION
QUALIFICATION



TESTS

VERIFICATION OF CORRECT
EQUIPMENT INSTALLATION

ENSURES

CORRECT INSTALLATION OF
SYSTEM PER SPECS

ESTABLISHES

A BASELINE FOR EQUIPMENT

OQ

OPERATIONAL
QUALIFICATION



TESTS

VERIFICATION OF CORRECT
EQUIPMENT OPERATION

ENSURES

CORRECT OPERATION OF
SYSTEM PER SPECS

VERIFIES

SYSTEM MEETS CLAIMS FROM
PARAMETER

PQ

PERFORMANCE
QUALIFICATION



TESTS

VERIFICATION OF CORRECT
EQUIPMENT PERFORMANCE

ENSURES

CORRECT PERFORMANCE OF
SYSTEM PER SPECS

VERIFIES

SYSTEM MEETS CUSTOMER'S
INTENDED PURPOSE

Why Dickson?

If you're in the quality assurance business like us, validation is a term you hear every day. "Validation" falls under the umbrella of terms businesses use to discuss the quality of their product, facility, or service. For those not well-versed in the world of quality assurance, hearing "validation" can send you running to hide under your desk. Luckily, Dickson offers validation services for our DicksonOne and DicksonWare software customers, also including temperature controlled equipment such as refrigerators, stability chambers, freezers, walk-in chambers, and much more.

Is your company ready for a quotation or need more information?
Contact a specialist today at 630-563-4207



TEMPERATURE MAPPING EXPERTS

Intense temperature can put your audit at risk.
Book your winter mapping study now to keep your assets from freezing.

Temperature mapping your facility, warehouse, or equipment is a daunting task. We know, we've done it a lot. Dickson can help keep your business fully compliant, streamline your business operations, and protect sensitive products with our temperature mapping services.



PLAN OF ATTACK

We evaluate and decide where to place devices for a successful mapping.



MEET AUDIT REQUIREMENTS

Rely on our expertise to create reports that are defensible in an audit.



IN-HOUSE CALIBRATED DEVICES

No 3rd party vendors here, saving you time and headaches.



WATCH WHILE WE WORK

We'll handle the process from start to finish so you don't lose time.



ENVIRONMENTAL INVESTIGATION

We're here to digest, analyze, and help you understand your facility and its data.

Want more information? Contact a specialist today!
630-563-4207

There’s No Reason to
Improve on the Best.
We Did it Anyway.

DSB

The newest member to the Dickson family.

Dickson’s Display Loggers, one of our top annual sellers, have been fully redesigned to incorporate features from our best selling devices into non-connected units.

The logger will be able to collect all of the temperature and humidity data you’ve become accustomed to from Dickson’s replaceable sensors. You can learn more about Replaceable Sensors on page 13.

Starting at \$199, the DSB is now available to order! Visit DicksonData.com/DSB for more info.



TEMPERATURE SENSORS STARTING AT \$110

- Single/Dual K-Thermocouple Temperature Sensor •
- Single/Dual Temperature Thermistor Sensor •
- Ambient Temperature & Humidity Sensor •
- Platinum RTD Temperature Sensor •
- Ambient Temperature Sensor •



**REPLACEABLE
SENSORS**



**UPDATED
DICKSONWARE**



**UP TO 2X THE
BATTERY LIFE**



**MORE
COMPACT DESIGN**



Introducing Legacy Uploader.

View, analyze and export your data in a 21CFR11 compliant environment. Want to share your data with others throughout the company? Then manually upload all of your downloaded data to the DicksonOne Cloud thanks to our new Legacy Uploader tool.



For more information visit DicksonData.com/DicksonWare.



FILE EXPORT

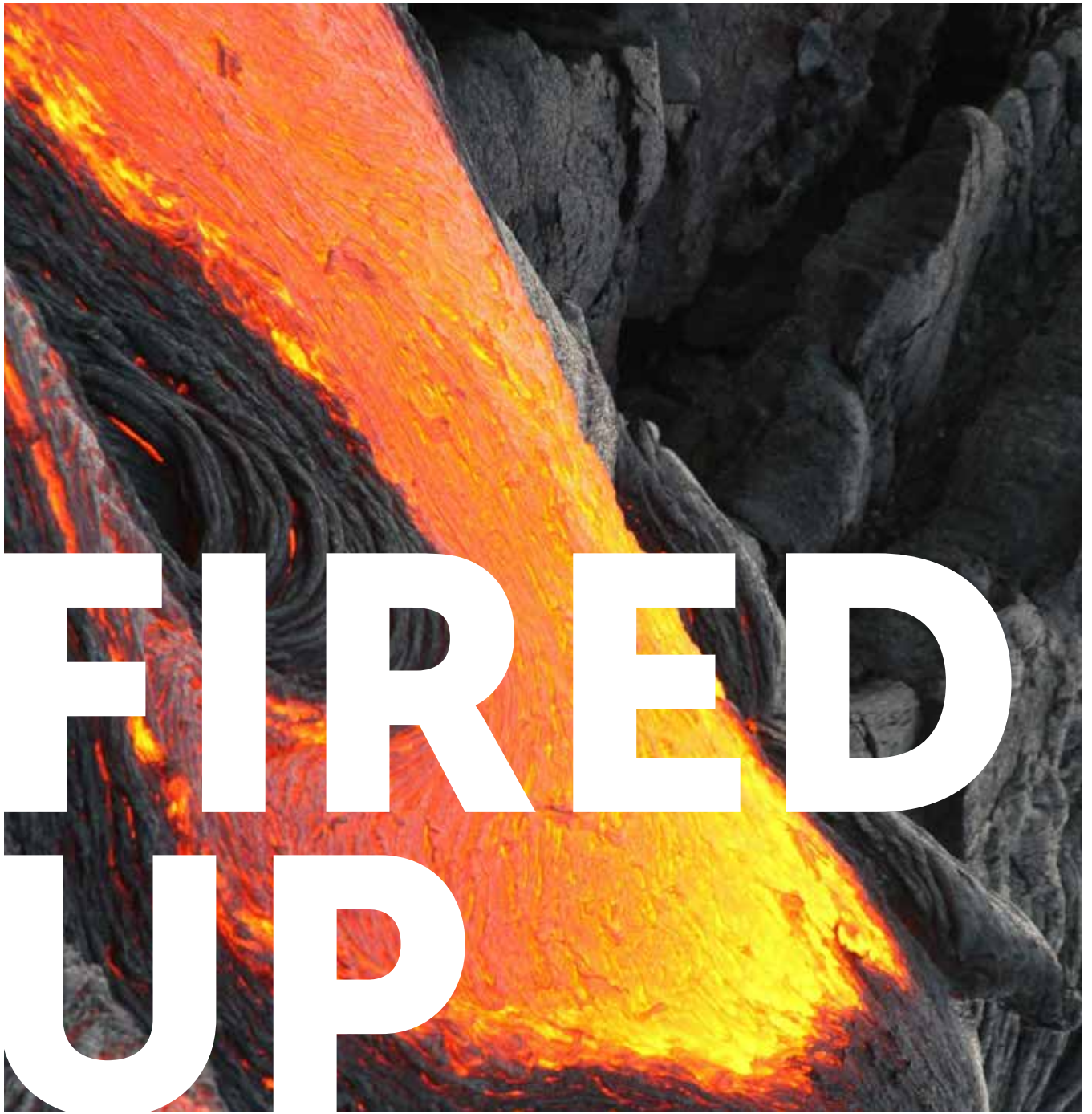
VIEW YOUR DATA

Take your data with you wherever it's been uploaded. And, thanks to our new Legacy Uploader, you can save your data to the cloud to view on any connected device.



Put a friendly face to your data.

Dickson is exhibiting at a trade show near you. Whether you're new to data monitoring or a long-time friend of ours, feel free to stop by and put a face to the name of the world's widest selection of top quality instruments for your monitoring needs.



FIRED UP

Volcanoes and Their Impact on Earth

| Have you ever reached your boiling point? You know what I mean--that point where you feel like you're going to bubble over and explode in anger. Even if you've never blown your top, the planet you live on sure has.

Consider this. According to the United States Geological Survey, "Mount St. Helens released 24 megatons of thermal energy, 7 of which was a direct result of the blast (when it erupted in the 80s)." That is an incredible amount of energy. So much so, in fact, that it was the "equivalent to 1,600 times the size of the atomic bomb dropped on Hiroshima."

There are a number of important things to know when it comes to volcanoes.

First, you have to understand them. LiveScience.com does a good job explaining their creation.

"Volcanoes form when chambers of magma, or hot molten rock, boil to the surface. These magma chambers often remain sealed for hundreds of years between eruptions, until the pressure builds sufficiently to break through a vent, which is a crack or weak spot in the rock above.

"The blast creates a crater, where lava and ash spill out, forming the cone. On some volcanoes, the magma chamber collapses after a violent eruption and a caldera forms, which is just a large, bowl-shaped crater. Sometimes these calderas fill with water, as happened at Crater Lake in Oregon."

The 1980 Mount St. Helens eruption wasn't just powerful. It was expensive. Estimates from the explosion totalled nearly \$450 million between federal, private, state, and local costs for cleanup and recovery. Adjusted for inflation, that's more than \$1.3 billion in damage.

If monetary damage is crippling, than the deaths they can cause is heartbreaking. As recently as 1985, the eruption of Nevado del Ruiz in Colombia claimed the lives of 23,000 people. The impact of that volcano was drastic, but the eruption of Laki in Iceland in the late 1,700s far surpassed it. It's been estimated that its total impact may have claimed the lives of nearly a million people and about 25% of Iceland's entire population. Wired did a long form piece on this blast a few years ago. It put out so much magma and ash that it impacted almost the entire Northern Hemisphere.

"There are not many historical records from North America that mention

the arrival of the Laki haze, but tree ring records from northern Alaska suggest that July and August 1783 were very cold. The mean temperature in northern Alaska is 11.3°C, but the mean temperature recorded in May-August 1783 was only 7.2°C. Russian traders in Alaska noted a population decrease in the years after the eruption while Inuit oral histories do refer to a "Summer that did not come" that could correlate with the Laki eruption as well."

While we can't stop a volcanic blast, we can prepare for them. Today there are many ways that we can track conditions to recognize when one is coming to prepare and protect property and human lives through evacuation. One measureable factor is seismic activity. Earthquakes and tremors can often be a precursor to a volcanic event and is why Iceland is wired with seismometers as to detect them likely long before an eruption might occur.

That's only one of the many ways volcanologists prepare and predict when a volcano might erupt. According to GeoNet in New Zealand there have been five key ways that volcanoes have been monitored in the past.

Visual and Cameras — Some data can be collected by just taking time to look.

Seismic Monitoring — Seismic monitoring is the most widely used method and almost all monitored volcanoes have some kind of seismic monitoring system.

Ground Deformation — Measure to see what geographical changes have occurred.

Chemistry — Monitor the kinds of gases released as they rise to the surface.

Gas — Measure SO₂, CO₂, H₂S

LiveScience also discusses the importance of measuring surrounding water temperature and pH. An increase in either of these can suggest changes in the surrounding environment.

As you may imagine, monitoring doesn't stop once the lava has started to flow. Scientists are measuring the

ongoing effect of volcanoes on both the surrounding environment and the impact they may have on a global scale. Long story short, an eruption both cools and warms the Earth. An article in the Guardian provides some additional context.

"The cooling influence of an individual volcano will dominate for the period immediately after the eruption but the warming impact will last much longer. So the significance of each depends on the timeframe being considered. A very large volcano in 2011 may significantly reduce temperatures in 2012 but slightly warm them in 2100."

NASA has also authored a number of pieces on the study of volcanoes and their impact on the environment. In this piece they discuss the importance of monitoring water to better understand ongoing impact. That's because data they'd collected contradicted the hypotheses they'd believed true.

"In a climate model simulation of the past thousand years, mega-eruptions are, unsurprisingly, followed by mega-cold spells that reduce global temperatures by 2°F (more than 1°Celsius). But tracers of past climate, such as tree rings and polar ice thousands of years old, tell a different story. These records don't indicate such a drastic, worldwide cooling."

A mismatch in this climate data was recognized in 2012 after a major international study of climate model performance had been completed. Dr. Allegra LeGrande of NASA's Goddard Institute for Space Studies, New York, concluded in a study she authored that the problem likely centered on the models themselves. They're simplified in a way that can't represent the full complexity of the data and modeling.

"Strong eruptions shoot a complex stew of gases into the atmosphere: sulfur compounds, water vapor, halogens, carbon compounds and others. Atmospheric chemists have learned a great deal about the chemical reactions these gases and aerosols trigger in the atmosphere — and the climate consequences. Until very

recently, however, computational technology limited the scientists' ability to put all of their understanding of volcanic emissions' chemistry-climate interactions to work in computer simulations. Sulfur compounds, especially sulfur dioxide, are key to post-eruption cooling, so modelers had previously focused on sulfur chemistry. New technology now allows them to see how all the various gaseous emissions — including water in addition to sulfur dioxide — influence climate following a mega-eruption."

LeGrande explained what happened in her research when she changed the climate models to include this new data.

"We did a preliminary set of experiments that kept track of both sulfur and water. We showed that water can change the response to the sulfur dioxide injection."

Her research is only the starting point though. The team still needs to understand a full chemical makeup of what's actually contained within a volcanic plume.

"We believe future work will show the importance of other constituents, like ash and halogens. Our goal is to make sure that we have the best toolkit we can have for studying climate, including future volcanic eruptions," she continued in her discussion.

Those studies may be closer than ever to completion thanks to advancements in drone technology.

"Volcanologists and engineers in the UK have collected measurements from volcanic clouds, together with visual and thermal images of inaccessible volcano peaks, using an unmanned aerial vehicle (UAV), also known as a drone."

That according to a piece published in Sputnik News. The team used lightweight sensors connected to the drone and were able to measure the temperature, humidity and thermal data within volcanic clouds. This is still a far cry from measuring the chemistry of a volcanic plume, but it's closer than we've ever been and we'll keep getting closer the more we continue to

innovate and advance.

Technological advancement is as important in chemistry as it is in the world of temperature monitoring. It's why we continue to update and introduce new products for our customers that better simplify the monitoring landscape in highly regulated environments. It's why scientists are always on the lookout for new innovations that can make their work easier. We like to believe that's why so many of them turn to us to keep their work safe. Hopefully, with technological advancement leading the way, products like ours will keep their assets safe, their auditors happy, and always allow cooler minds to prevail.

Have something personal you'd like to add to the conversation? Send your thoughts to jeff@dicksondata.com for a chance to be featured in a future blog or article in our magazine.

CATEGORIES

- **8 — MEGA-COLOSSAL**
YELLOWSTONE, 174K YEARS AGO
- **7 — SUPER-COLOSSAL**
TAMBORA, 1815
- **6 — COLOSSAL**
KRAKATAU, 1883
- **5 — PAROXYSMAL**
ST. HELENS, 1980
- **4 — CATAclySMIC**
GALUNGGUNG, 1982
- **3 — SEVERE**
RUIZ, 1985
- **2 — EXPLOSIVE**
GALERAS, 1922
- **1 — GENTLE**
STROMBOLI, CONSTANT
- **0 — NON-EXPLOSIVE**
KILAUEA, CONSTANT



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