

Vibration Monitoring Practices and Technologies

*Presented by Rob Cyr & Jeff Corace
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Overview of Presentation

- Why Monitor?
- Regulatory Examples
- Proper Monitoring Practice
- Autonomous Vibration Monitoring
- Underground Mining Application

Why Monitor?

- Document compliance with established vibration guidelines
- Protect structures from damage
- Optimize blasting & minimize risk of damage or annoyance
- Protect against claims & lawsuits

Public Awareness

- Why do people get upset?
 - They were not informed of the blasting
 - They do not understand regulatory vibration limits
 - Believe that if they can feel the vibrations, there MUST be damage
 - Annoyed by the development or construction activities
 - Stress in their own personal and professional lives

What you can do to ease the public concerns

- Notify public of construction operations (visible signs and written notices)
- Provide literature, web sites and videos explaining construction
- Explain your monitoring program
- Provide access to records: event reports, threshold levels for damage to structures
- Listen to their concerns

Regulatory Examples

● Canada

- Ontario NPC-119
 - PPV: 12.5mm/s
 - Overpressure: 128 dB(L)
- Quebec Directive 019
 - PPV: Varies with frequency
 - Overpressure: 128dB(L)
- Manitoba MMA 1992
 - PPV: 12mm/s (R), 50mm/s (NR)
 - Overpressure: 130dB(L) (R), 150dB(L) (NR)
 - Overpressure: 140dB(L) (Human Exposure)

Regulatory Examples

- Australia - ANZEC
 - PPV: 5mm/s
 - Overpressure: 115dB(L)
- USA - Pennsylvania
 - PPV: 12mm/s (R), 50mm/s (NR)
 - Overpressure: 130dB(L) (R), 150dB(L) (NR)
 - Overpressure: 140dB(L) (Human Exposure)

Components of a Proper Monitoring Program

- Equipment
- Design
- Implementation
- Analysis
- Public Relations

Autonomous Vibration Monitoring (AVM)

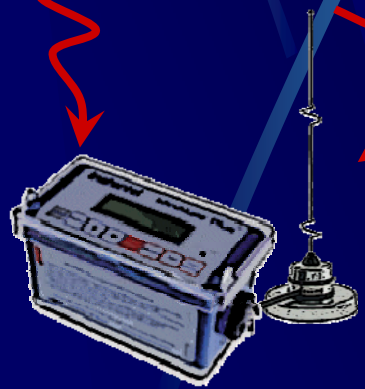
- Couples internet with seismographs
- Automatic event distribution
- AVM Package
 - Vibration Monitor
 - Modem (cellular or land line)
 - Power source
 - Data processing system
 - Website/cell phone/e-mail

AVM Telemetry

Blast Occurs



Event Transmitted to IPS
Through Phone Network



Seismograph
Triggers

IPS Resets Unit and
Starts Monitoring

AVM Data Processing

IPS Processes
XML and WMF Files

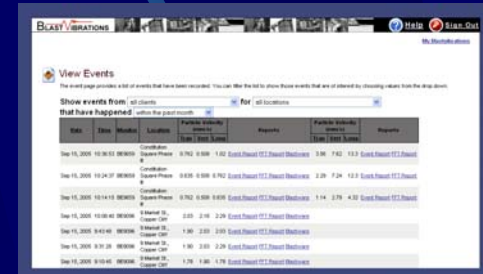


XML and WMF
Files Transmitted
And Verified
For Processing

FPS
Creates GIF and
PDF



FPS Updates
Web Page



Event Sent to
Cell Phone or
Email



Web User Interface

- Secure site
- View vibration data
- User based filters



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Simply the most effective, efficient way to monitor today!

The BlastVibrations monitoring system represents the latest advancement in the evolution of the vibration monitoring and control industry. Developed in response to a demand for an automated system that provides immediate access to vibration data. The BlastVibrations system leverages the power of the Internet to simplify the monitoring and reporting process permitted through a secure and reliable access to data from anywhere, at anytime.

System Highlights:

- Automatic downloading of data immediately after event or at specified times
- Automatic notification and event reporting directly to your e-mail account
- Controlled access to data through an Internet connection from anywhere, anytime
- Permits remote access to the seismograph from your PC
- Easily view and filter historical event reports
- No complicated hardware/software requirements

Today's Events

Event ID	Event Name	Event Type	Event Date	Event Time	Event Location	Event Status
1001	1001 - 1001	1001	1001	1001	1001	1001
1002	1002 - 1002	1002	1002	1002	1002	1002
1003	1003 - 1003	1003	1003	1003	1003	1003
1004	1004 - 1004	1004	1004	1004	1004	1004
1005	1005 - 1005	1005	1005	1005	1005	1005

My Preferences

Download

Engineering Reports

Administration

Web User Interface

- Sort Events by Date/Job/unit

BLAST VIBRATIONS [Help](#) [Sign Out](#) [My Blastvibrations](#)

View Events

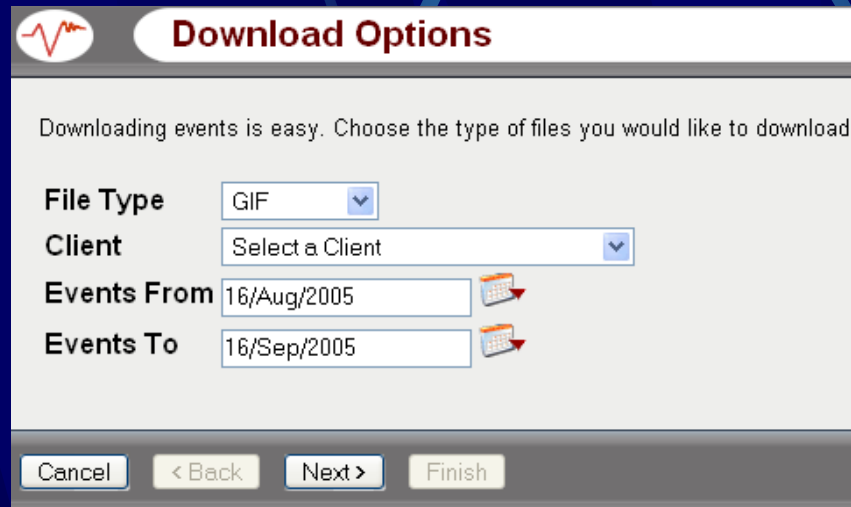
The event page provides a list of events that have been recorded. You can filter the list to show those events that are of interest by choosing values from the drop down.

Show events from for
that have happened within the past month

Date	Time	Monitor	Location	Particle Velocity (mm/s)			Reports	Particle Velocity (mm/s)			Reports
				Tran	Vert	Long		Tran	Vert	Long	
Sep 15, 2005	10:36:53	BE9659	Constitution Square Phase III	0.762	0.508	1.02	Event Report FFT Report Blastware	3.56	7.62	13.3	Event Report FFT Report
Sep 15, 2005	10:24:37	BE9659	Constitution Square Phase III	0.635	0.508	0.762	Event Report FFT Report Blastware	2.29	7.24	12.3	Event Report FFT Report
Sep 15, 2005	10:14:15	BE9659	Constitution Square Phase III	0.762	0.508	0.635	Event Report FFT Report Blastware	1.14	2.79	4.32	Event Report FFT Report
Sep 15, 2005	10:08:40	BE9096	9 Market St., Copper Cliff	2.03	2.16	2.29	Event Report FFT Report Blastware				
Sep 15, 2005	9:43:48	BE9096	9 Market St., Copper Cliff	1.90	2.03	2.03	Event Report FFT Report Blastware				
Sep 15, 2005	9:31:28	BE9096	9 Market St., Copper Cliff	1.90	2.03	2.29	Event Report FFT Report Blastware				
Sep 15, 2005	9:10:45	BE9096	9 Market St., Copper Cliff	1.78	1.90	1.78	Event Report FFT Report Blastware				

Web User Interface

- Download options
 - Filter events
 - PDF, GIF, Blastware file



The screenshot shows a dialog box titled "Download Options" with a red waveform icon in the top-left corner. The dialog contains the following elements:

- A text instruction: "Downloading events is easy. Choose the type of files you would like to download."
- A "File Type" dropdown menu set to "GIF".
- A "Client" dropdown menu set to "Select a Client".
- An "Events From" date field set to "16/Aug/2005" with a calendar icon to its right.
- An "Events To" date field set to "16/Sep/2005" with a calendar icon to its right.
- A footer bar with four buttons: "Cancel", "< Back", "Next >", and "Finish".

Web User Interface

- Notification methods
 - Cell phone text message
 - Alphanumeric page
 - email



SAMPLE TEXT MESSAGE

AVM Situations

- Close quarters blasting
- Mining operations
- Quarry blasting

AVM Video Overview



Questions?