Ohio Dept. Of Natural Resources

Division of Mineral Resources Management

Preventing Flyrock Along I-70

Presented by

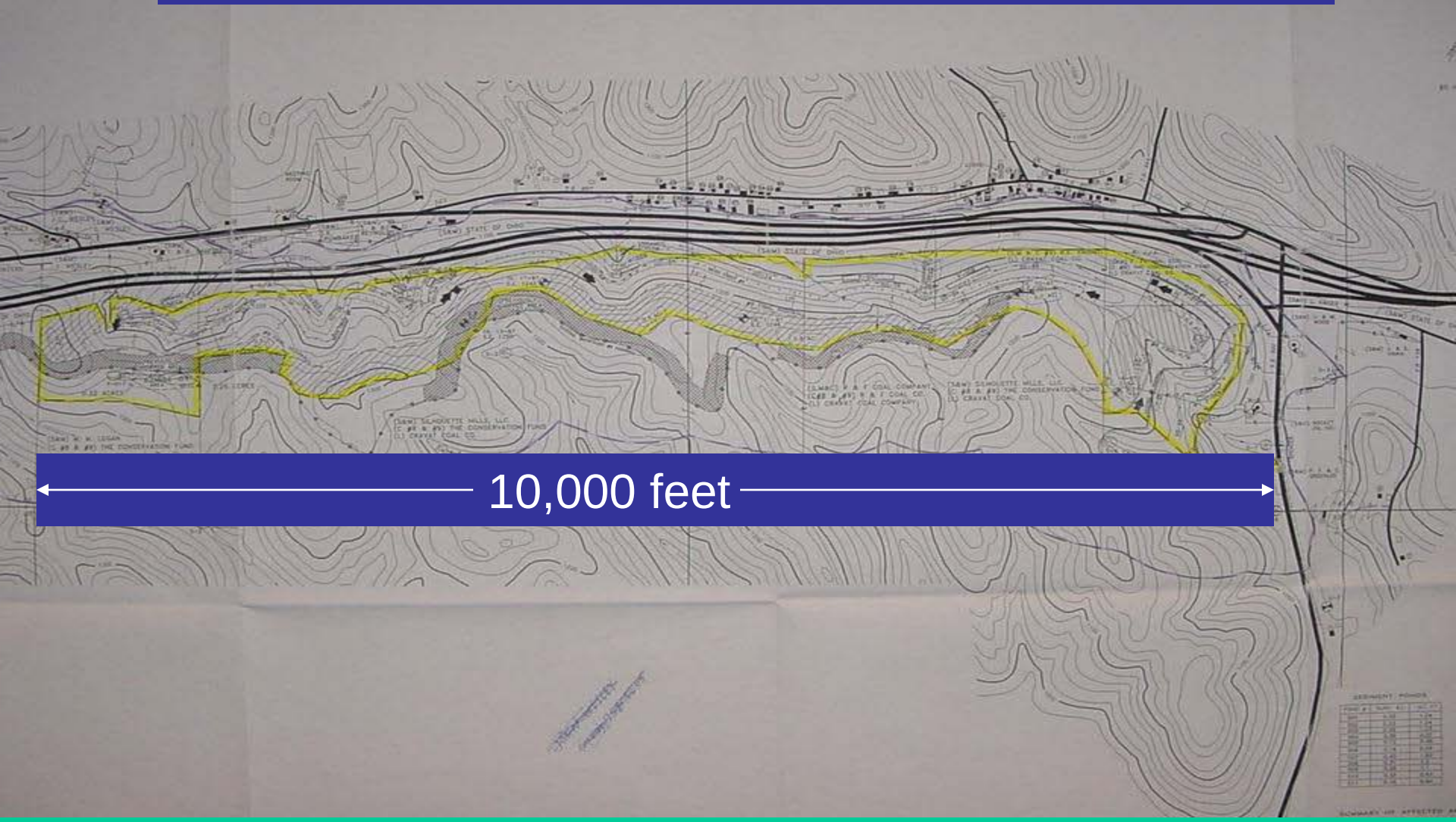
Mike Mann, Blasting Specialist

ODNR Div. of Mineral Resources Mgt.

EXIT 202
800
Barnesville
Dennison
1 MILE
OCT 18 2001

BIRTHPLACE OF
HOPALONG CASSIDY
Hopalong Cassidy and Lucky
at the "DOUBLE X" RANCH
Starring
WILLIAM BOYD
WITH TWO
POP-UPS
BASED ON CHARACTERS CREATED BY Clarence E. Mulford
8 2001

Cravat Coal Co. – “Hendrysburg” Permit Application



<u>Original Blast Plan Key Features</u>:

- Max. hole diameter of 6.25”
- Minimum stemming $\geq$ 0.7 x Burden
- Maintain low-wall or dyke (min. 10 feet)
- Stop traffic if within 200’ of I-70; use spotters for other distances

U.S. DEPARTMENT OF THE INTERIOR

OFFICE OF SURFACE MINING

Hold Everything! It's:

- Too close
- Too steep
- Too much traffic

OSM PREFERENCE:

“STOP TRAFFIC FOR ALL BLASTS WITHIN 1,000 FEET OF I-70”

New Blast Plan Needed to Protect

Motoring Public Along I-70 and SR 800

CRAVAT
COAL COMPANY

Considerations for New Blast Plan:

- Stop traffic and/or prohibit blasting under certain conditions/distances
- Restrict overall scale of blasts
- Encourage good blast design
- Give blast design authority to blaster
- Accountability to blast plan

27-Point Plan

No Blasting Within 300’ Of:

- I-70
- SR 800
- I-70 Exit Ramp

Create low-wall or dike (min. 10’)

MILE
203
EXIT 202
800
Barnesville
Dennison
BLASTING
ZONE
OCT 18 2001

TURN OFF
2-WAY
RADIO
OCT 18 2001

END
BLASTING
ZONE
OCT 18 2001

DANGER
BLASTING AREA
BE ALERT
WARNING!
EXPLOSIVES IN USE
BLASTING SIGNALS
PRE-BLAST WARNING SIGNAL 3 LONG AIR HORN BLAST
ALL-CLEAR SIGNAL 1 LONG AIR HORN BLAST
BLASTING AREAS AND CHARGED HOLES WILL BE MARKED "BLASTING AREA"
1-740-942-4656
CRAVAT COAL CO.
OHIO
CADIZ, OHIO
PERMIT NO. D-2028
OCT 18 2001

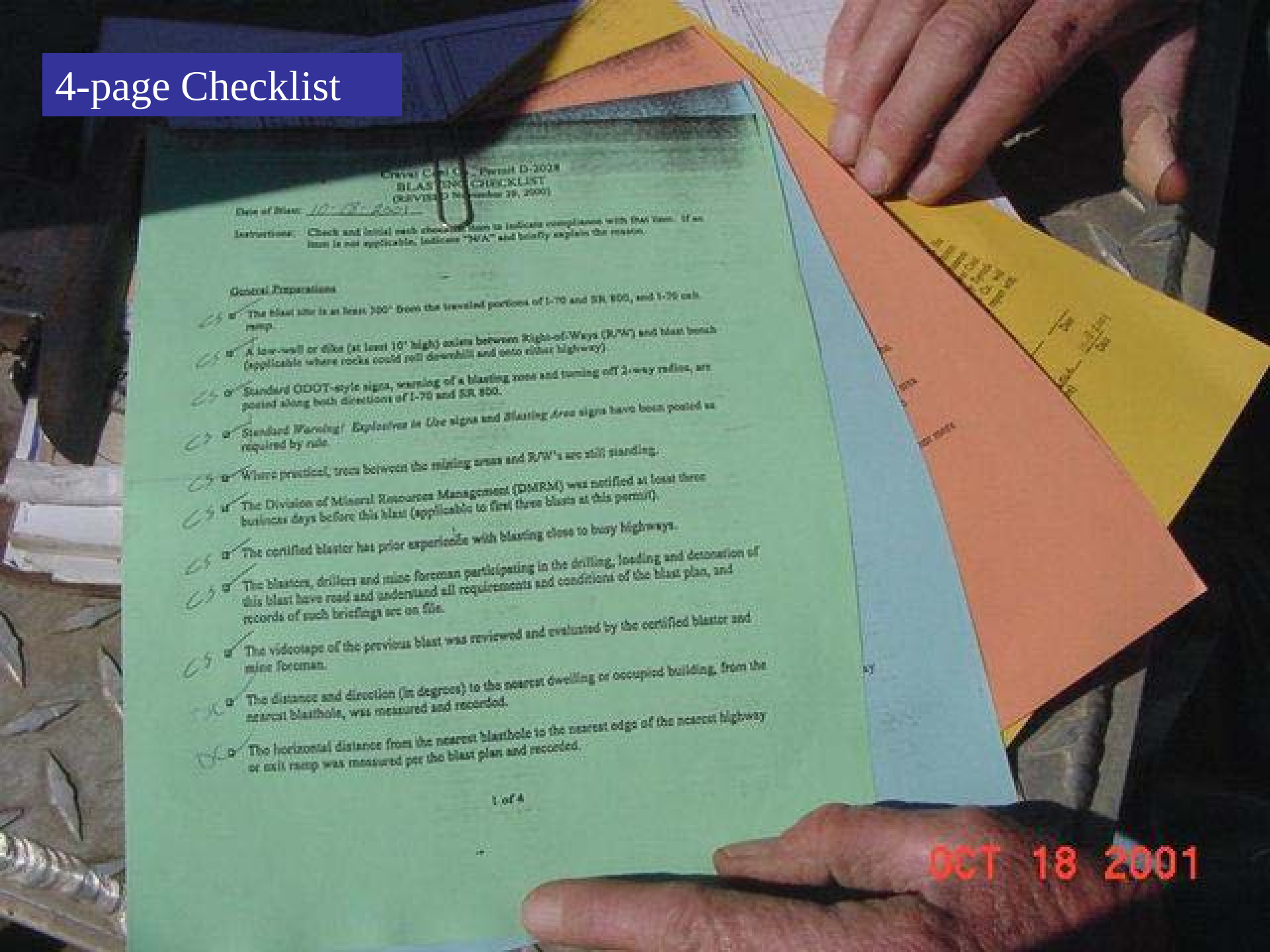
DANGER
BLASTING
KEEP AWAY
DANGER
NO
SMOKING
OCT 18 2001

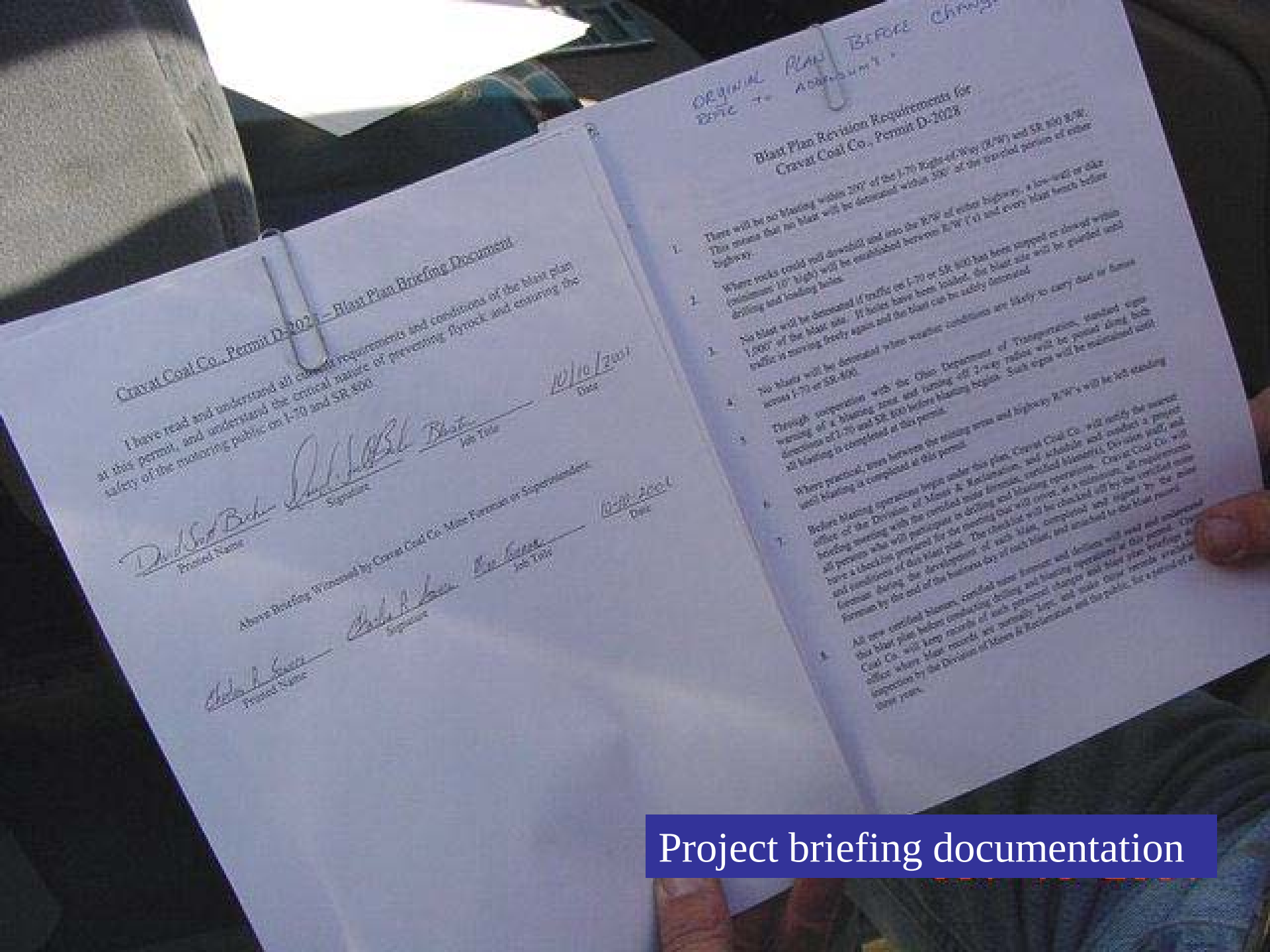
Leave the trees alone!

Prior experience close to busy highways

Project Briefing for All

4-page Checklist





Project briefing documentation

Cravat Coal Co., Permit D-2028 – Blast Plan Briefing Document

I have read and understand all current requirements and conditions of the blast plan at this permit, and understand the critical nature of preventing flyrock and ensuring the safety of the motoring public on I-70 and SR 800.

Blaster — Job Title

10/10/2001 — Date

Signature

David Scott Becker — Printed Name

Above Briefing Witnessed by Cravat Coal Co. Mine Foreman or Superintendent:

Mine Foreman — Job Title

10-10-2001 — Date

OCT 18 2001

Call ODNR/DMRM at least
3 days before first 3 blasts

OHIO DEPARTMENT OF NATURAL RESOURCES
MINERAL RESOURCES MANAGEMENT
CHEROKEE
NOV 10 2004

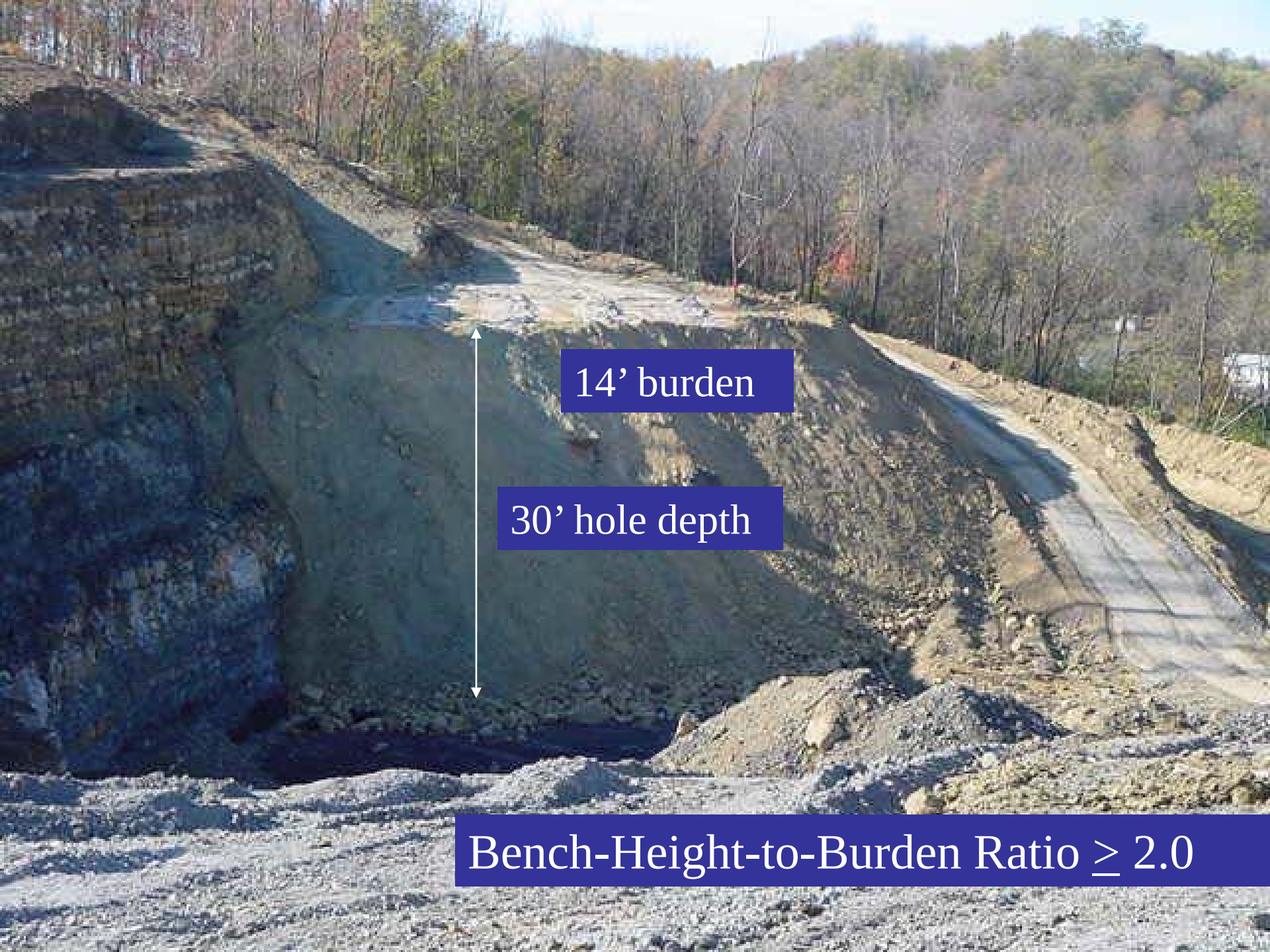
Every blast monitored at nearest dwelling

Measure and record distance
to I-70 and SR 800

Blaster determines drill pattern and marks hole locations (!)

Hole diameter ≤ 6.25 inches

Burden fell within range of 25 to 35 times the hole diameter (divided by 12)


14’ burden
30’ hole depth
Bench-Height-to-Burden Ratio ≥ 2.0

Explosives and Blasting Procedures (USBM's IC 8925)

- Recommends minimum hole-depth-to-burden ratio of 1.5

Surface Blast Design
(Cal Konya, 1990)

Potential for Flyrock Problem related to Stiffness Ratio (L/B):

- 1.0 = severe (high probability)
- 2.0 = fair control
- 3.0 = good control
- 4.0 = excellent control

Surface Blast Design
(Cal Konya, 1990)

Potential for Flyrock Problem related to Stiffness Ratio (L/B):

- 1.0 = severe (high probability)
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- 3.0 = good control
- 4.0 = excellent control
- **L/B = 4’/13’ = 0.3 !!!**

Driller completes drill log as holes are drilled

Drill log documents hole depths and conditions

Blaster communicates with driller before loading holes

Blaster signs drill log

Hole loading closely supervised and controlled by certified blaster.

Hole loading ceases if certified blaster must leave blast site.

Powder factor not to exceed 1.0 lbs./cubic yard

Holes adjacent to exposed rock faces were loaded with packaged products.

Stemming ≥ 0.7 x Burden, in competent, consolidated rock

Crushed stone kept on hand for use in wet holes, at request of blaster.

Use initiation systems best suited to site conditions.

Design delay pattern so primary rock movement not directed toward I-70.

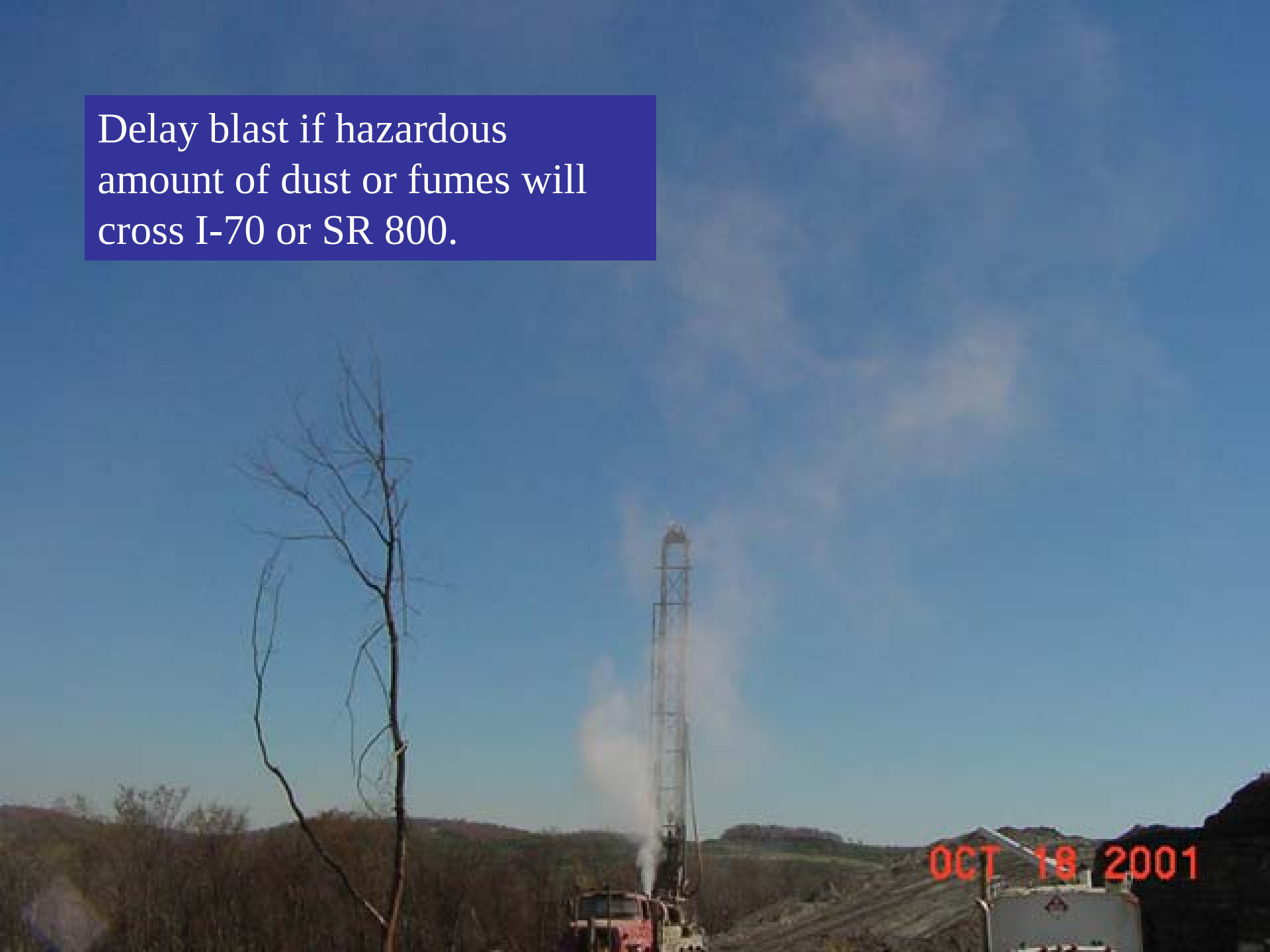
Seismograph at
nearest dwelling

Spotter along I-70 in radio contact with mine foreman.

Second spotter, if necessary.

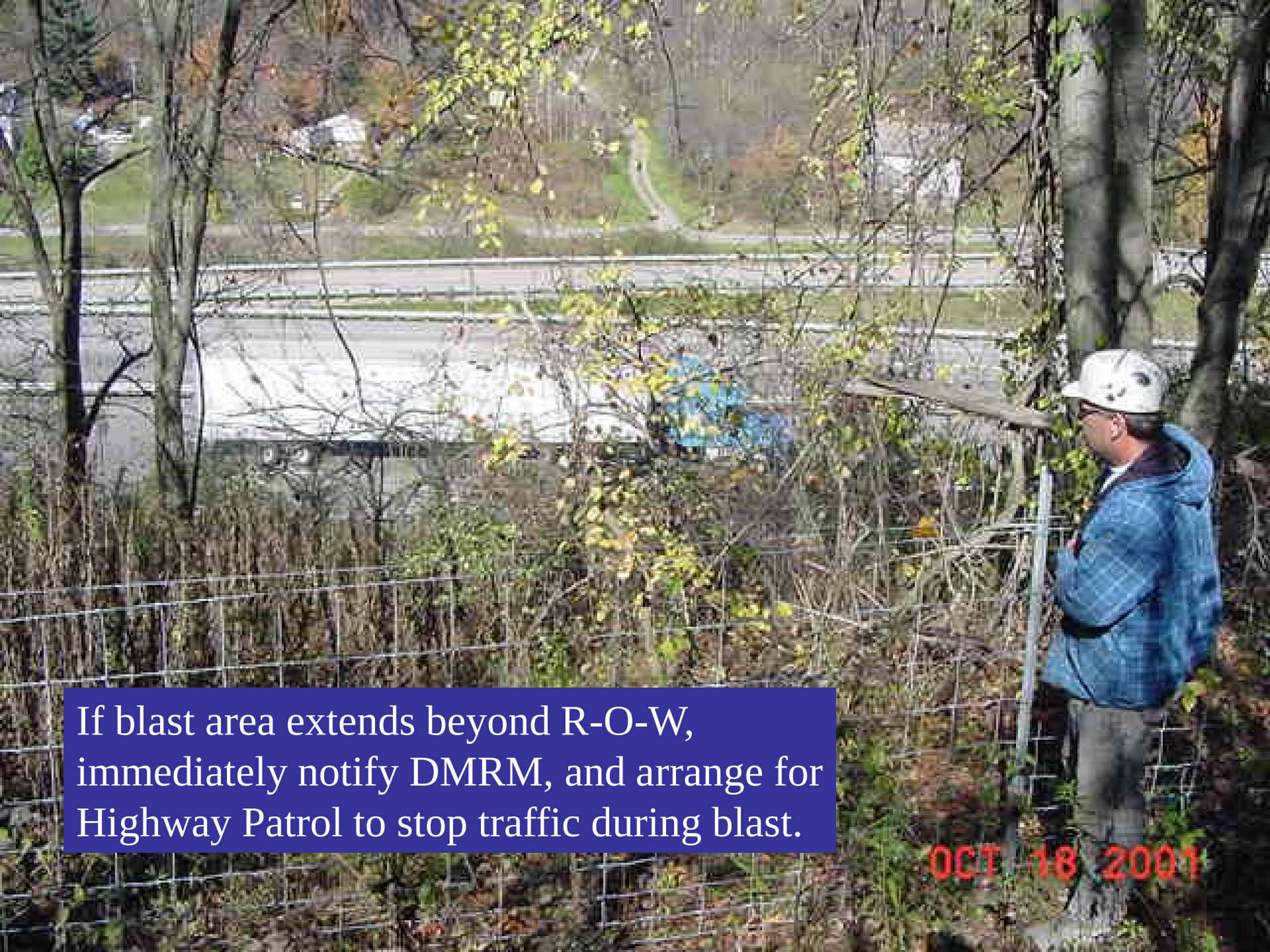
Delay blast if traffic stopped or slowed.

Delay blast if hazardous amount of dust or fumes will cross I-70 or SR 800.



Video-tape each blast

Blaster defines extent of blast area and communicates to mine foreman.



If blast area extends beyond R-O-W, immediately notify DMRM, and arrange for Highway Patrol to stop traffic during blast.

Mine foreman controls access to blast area.

Pre-blast warning signal

“Fire in the Hole!”

OCT 18 2001

OCT 18 2001

Post-blast inspection

All-clear signal

View each blast recording
before next blast is designed.
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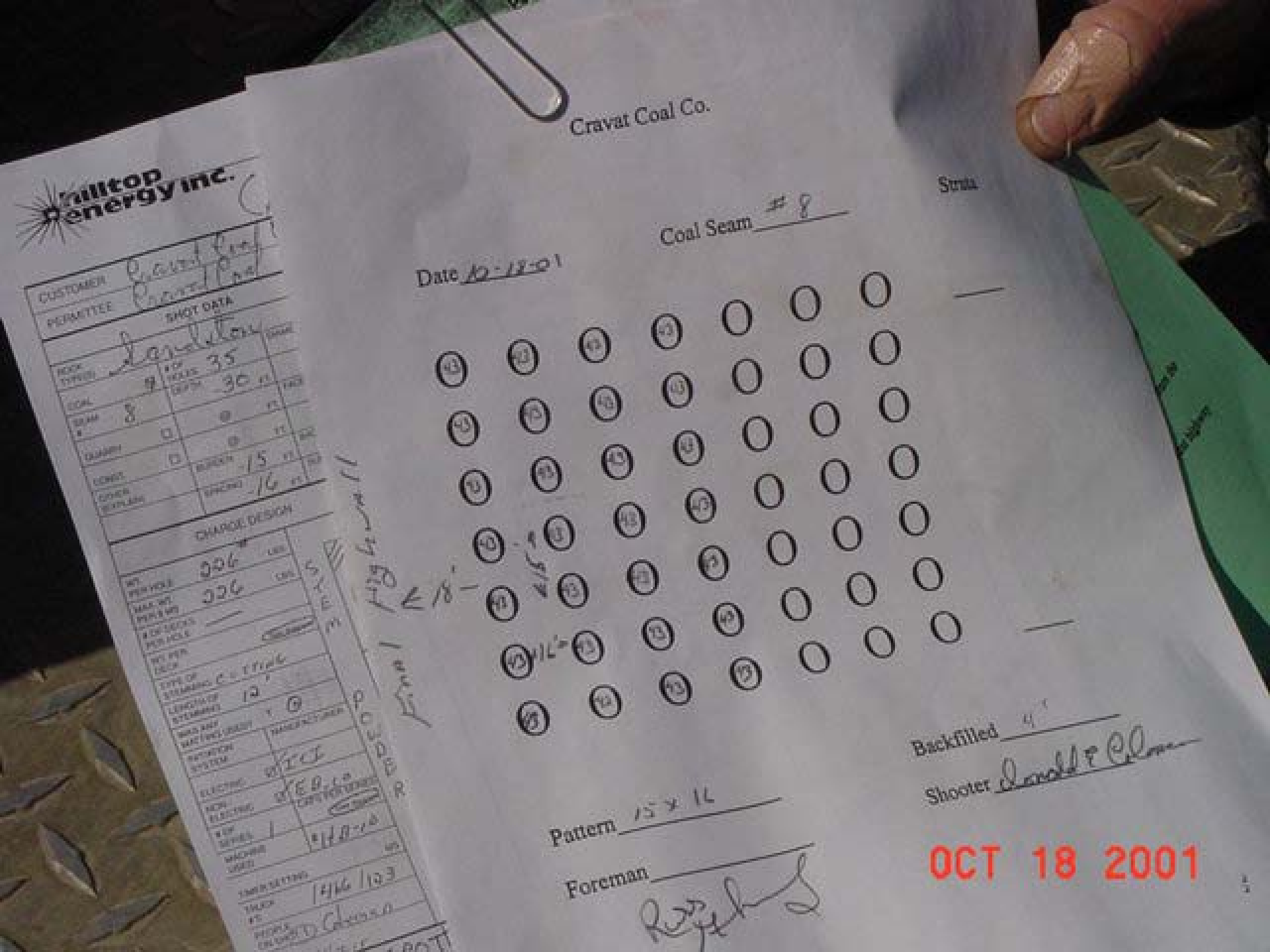
View Videotapes

Completing blast record.

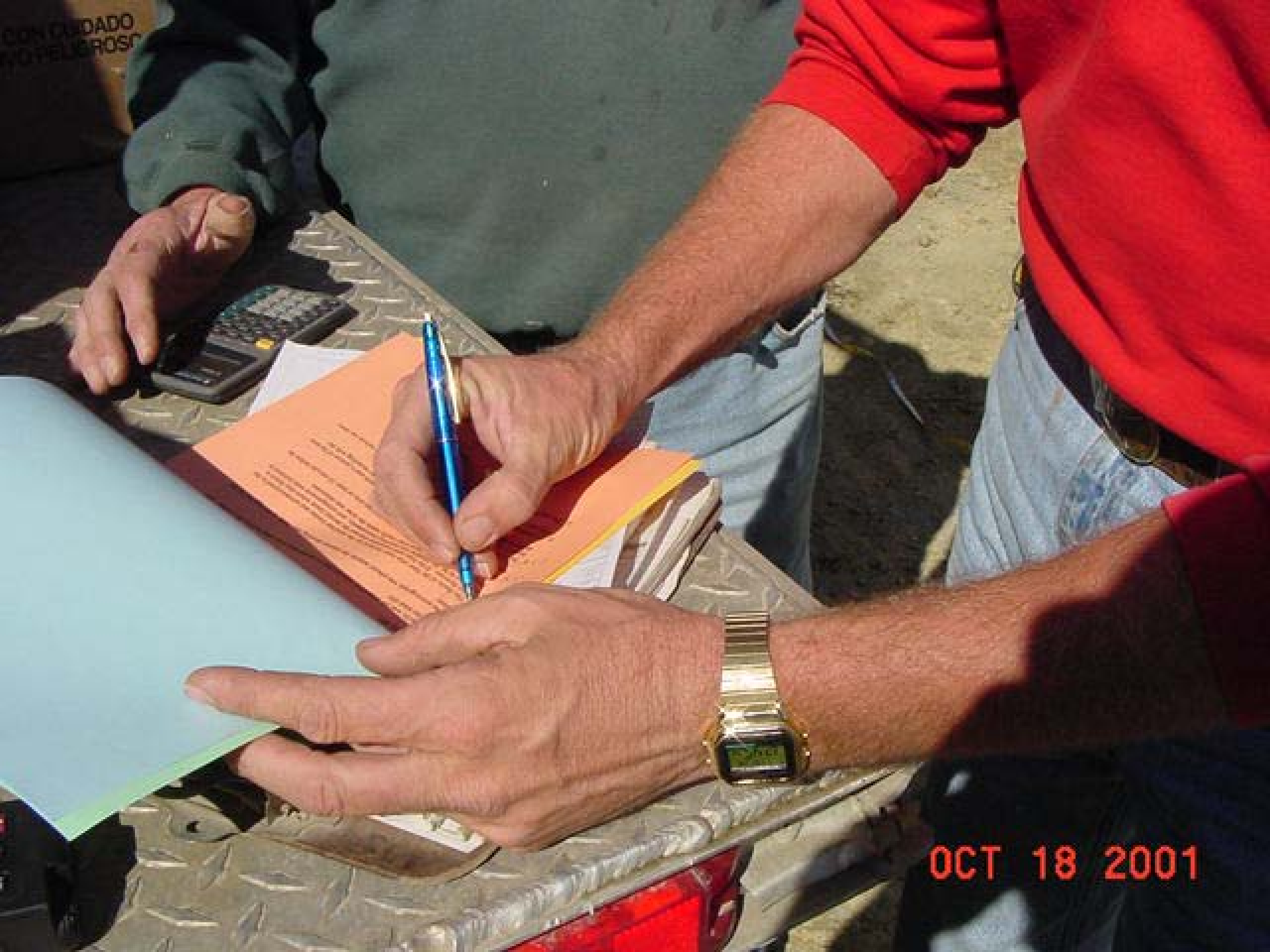
Site-specific Blast Record Info.

- Distance to nearest highway
- Measures to compensate for field conditions such as cracks, voids, mud seams, etc.
- Names of blast crew members and spotters


Cravat Coal Co.
Hilltop Energy inc.
Strata
Coal Seam #8
Date 10-18-01
Backfilled 4'
Shooter
Pattern 15 x 16
Foreman
OCT 18 2001
CUSTOMER
PERMITTEE
SHOT DATA
CHARGE DESIGN
STEM
POWDER

OCT 18 2001

OCT 18 2001


CON CUIDADO
MOVIMIENTO PELIGROSO
OCT 18 2001

Records on File:

- Project briefing documents
- Blast records
- Videotapes

So…what if…?

- Spotter immediately notifies mine foreman
- Mine foreman immediately notifies Ohio Highway Patrol and DMRM
- Cravat Coal cooperates with OHP to safely remove rocks
- Flyrock report filed with DMRM per rule

Project Summary

- October 2000 to December 2001
- 142 blasts; 5,630 holes; 8,050 detonators
- Hole depths of 24’ to 64’
- 1.6 mil pounds of explosives
- 1.9 mil cubic yards of overburden
- PPV’s and airblasts well below limits
- **NO FLYROCK INCIDENTS !!**

I-70 SLIP REPAIR

EXIT 204
40
EAST
National Rd
County Rd 100
1 MILE
BLASTING ZONE
CAT
AUG 9 2005

AUG 9 2005

AUG 9 2005

PrimeSource
MACK
AUG 9 2005

CAUTION
BLASTING
AT 2:30
AUG 24 2005

BE
PREPARED
TO STOP
AUG 24 2005
VEHICLE

PREPARE TO STOP
PREPARE TO STOP
AUG 24 2005

EAST
SOUTH
NORTH
OHIO STATE
HIGHWAY
PATROL
OCT 18 2001

STOP
STOP
STOP
AUG 9 2005

SPEED LIMIT
65 MPH
55
AUG 24 2005

Traffic Control Costs

- 4 Ohio Highway Patrol Cars at $50/hr. each
- Times 4 hours = $800
- Minimum of 4 ODOT workers for 2 hours
- Electronic message signs
- ESTIMATE: $1,500 per blast