USE OF SOIL STABILIZERS ON HIGHWAY SHOULDERS

VDOT

Background

General Assembly action:

VTRC shall study the use of soil stabilizers in highway shoulders at one or more selected locations with the objective of finding a method of substantially reducing the occurrence of pavement/shoulder drop-off at a reasonable cost.

Research Plan

- Field study only
- No laboratory analysis involved
- Two locations
- Three stabilizers
- Test and Control Evaluation

Project Modifications

- One type of shoulder material (crushed stone).
- Two stabilizers
  - Soiltac (vinyl acetate copolymer emulsion)
  - Centrophase AD (soy/lecithin emulsion)
- One location (Route 522, Powhatan Co.)

Before

VDOT

After

VDOT

Centrophase
9/14/2005

Soiltac
9/14/2005

Hypotheses

WORKING: The addition of stabilizers to the shoulder material did affect the strength of the material

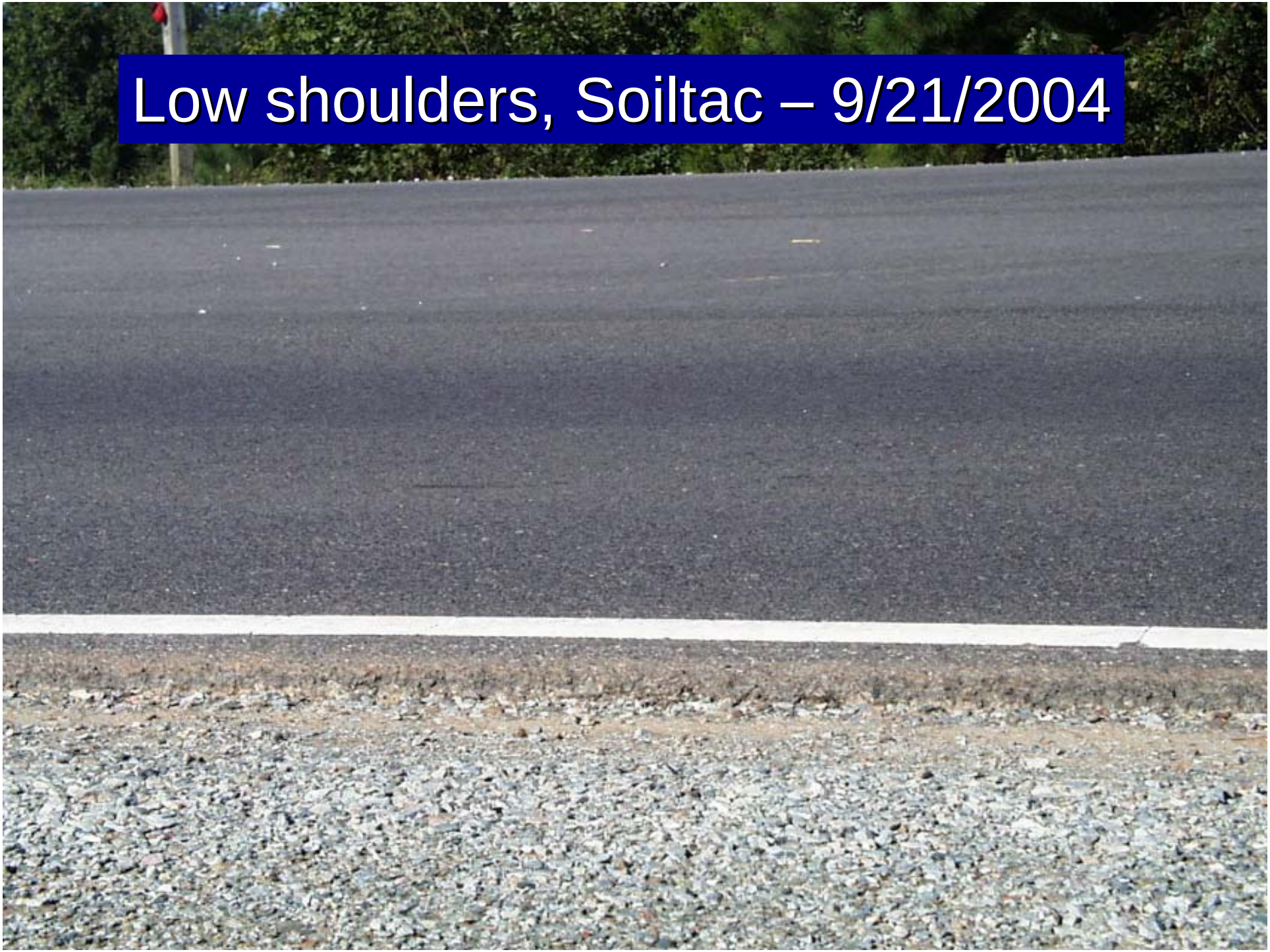
NULL: The addition of stabilizers to the shoulder material did not affect the strength of the material

As measured by its stiffness and bearing capacity

Performance Data

Dynamic Cone
Penetrometer (DCP)
GeoGauge
Visual

Low shoulders, Soiltac – 9/21/2004



Low shoulders, Control – 9/21/2004

Other Findings
Visual Inspection

- 9/14 –12/14, the surface of both test sections were firmer than the control section
- 2/8, the surface of both test sections were softer than the control section

Findings – Objective Tests

- Statistically speaking, on no occasion were test section data better than the control section data
- The 2/8/2005 data supports the visual inspection data
- Overall, the data supports the null hypothesis

Null Hypothesis

The addition of stabilizers to the shoulder material did not affect the strength of the material as determined by measurement of its stiffness and bearing capacity

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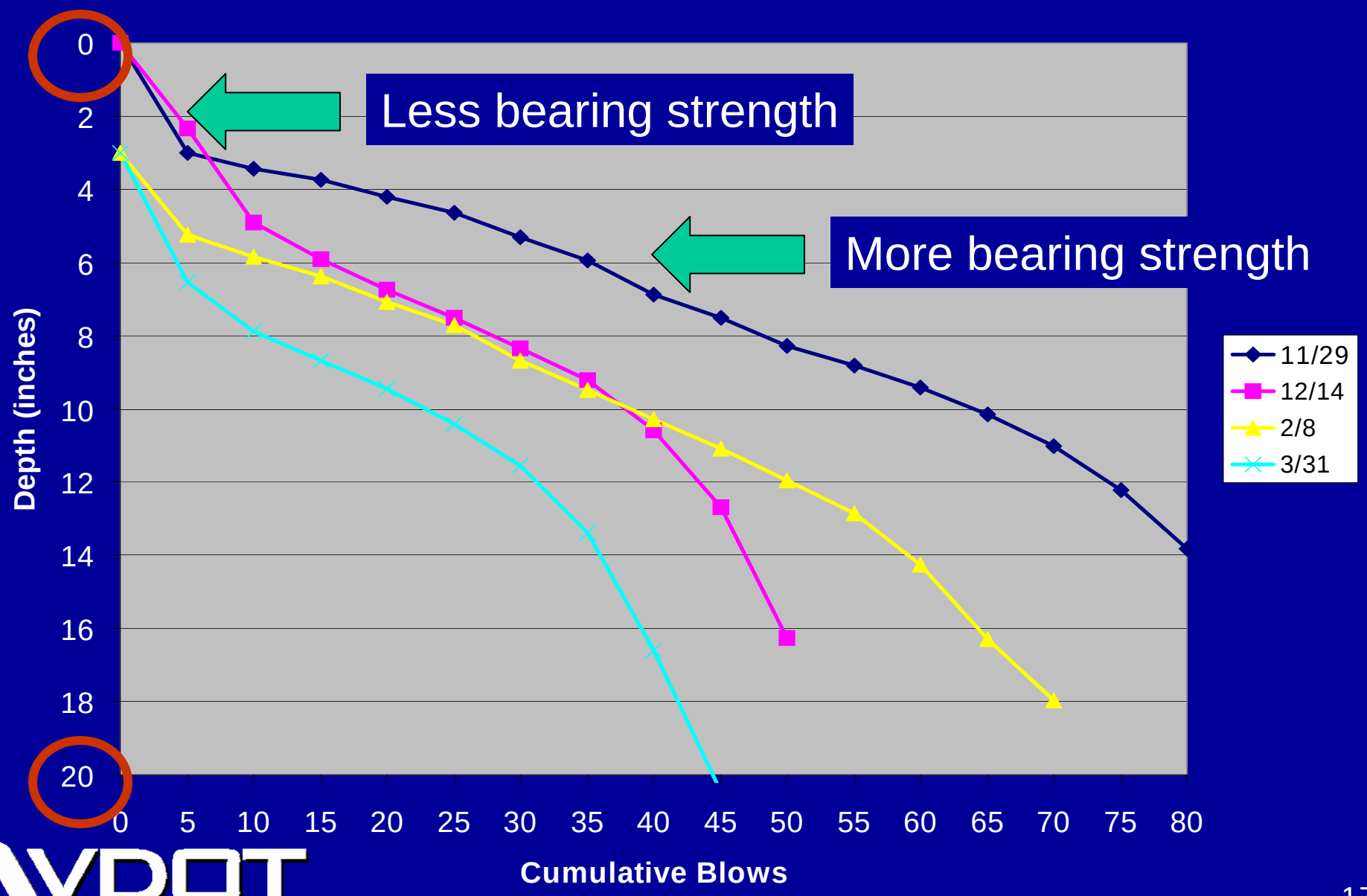
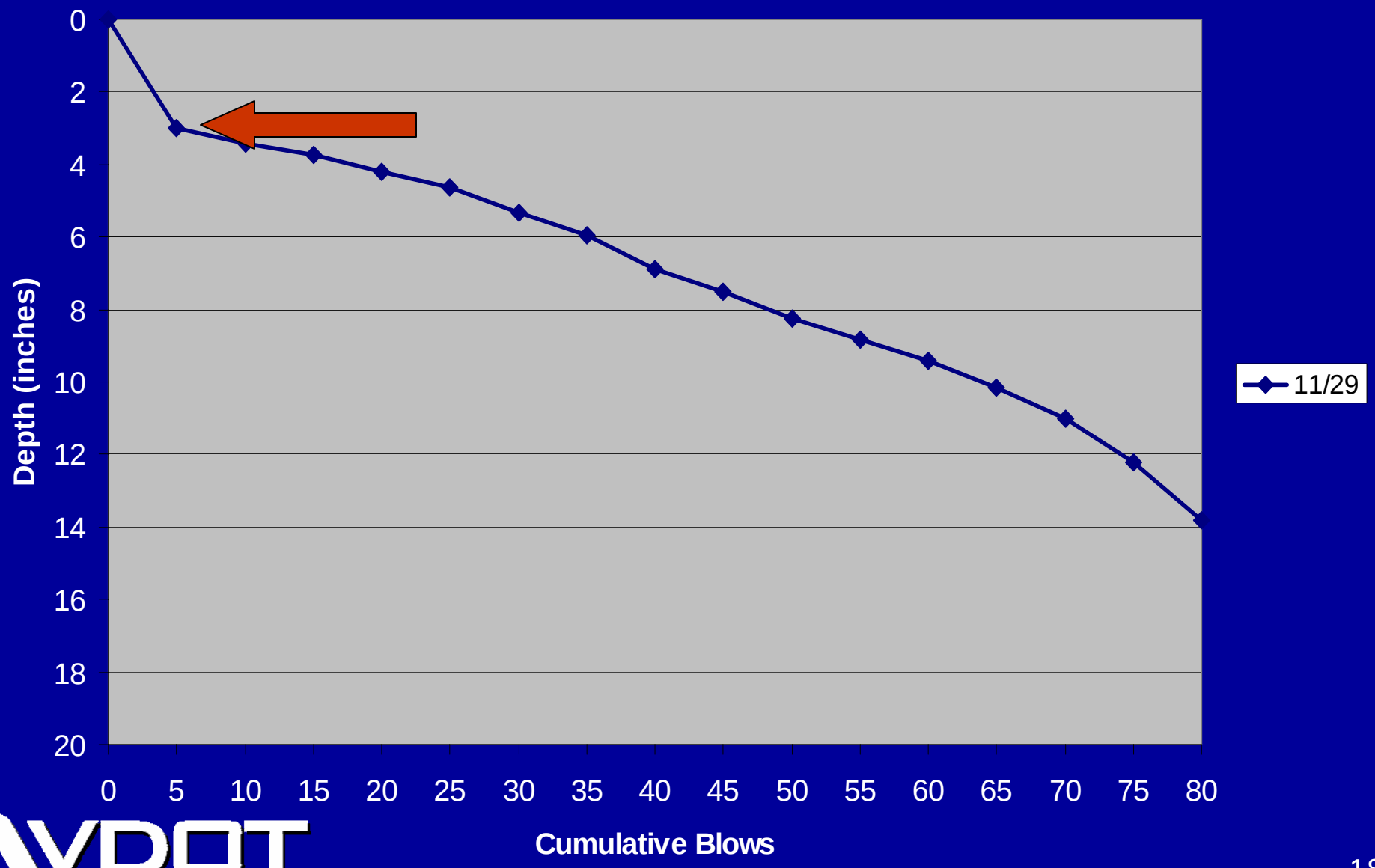

DCP Penetration Readings for Sample Control-6, by Date
Less bearing strength
More bearing strength
Depth (inches)
0
2
4
6
8
10
12
14
16
18
20
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
Cumulative Blows
11/29
12/14
2/8
3/31

DCP Penetration Readings for Sample Control-6, by Date



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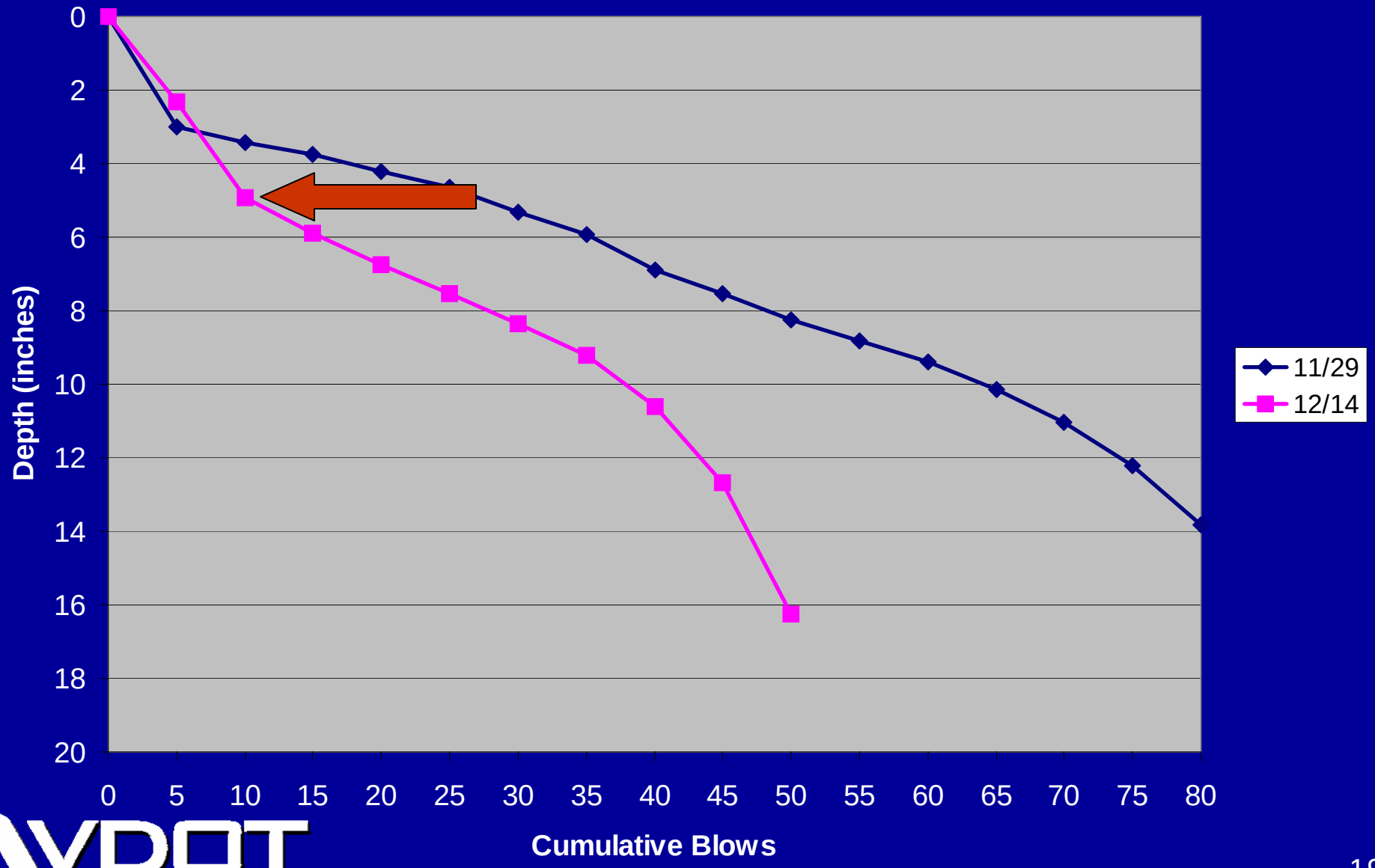

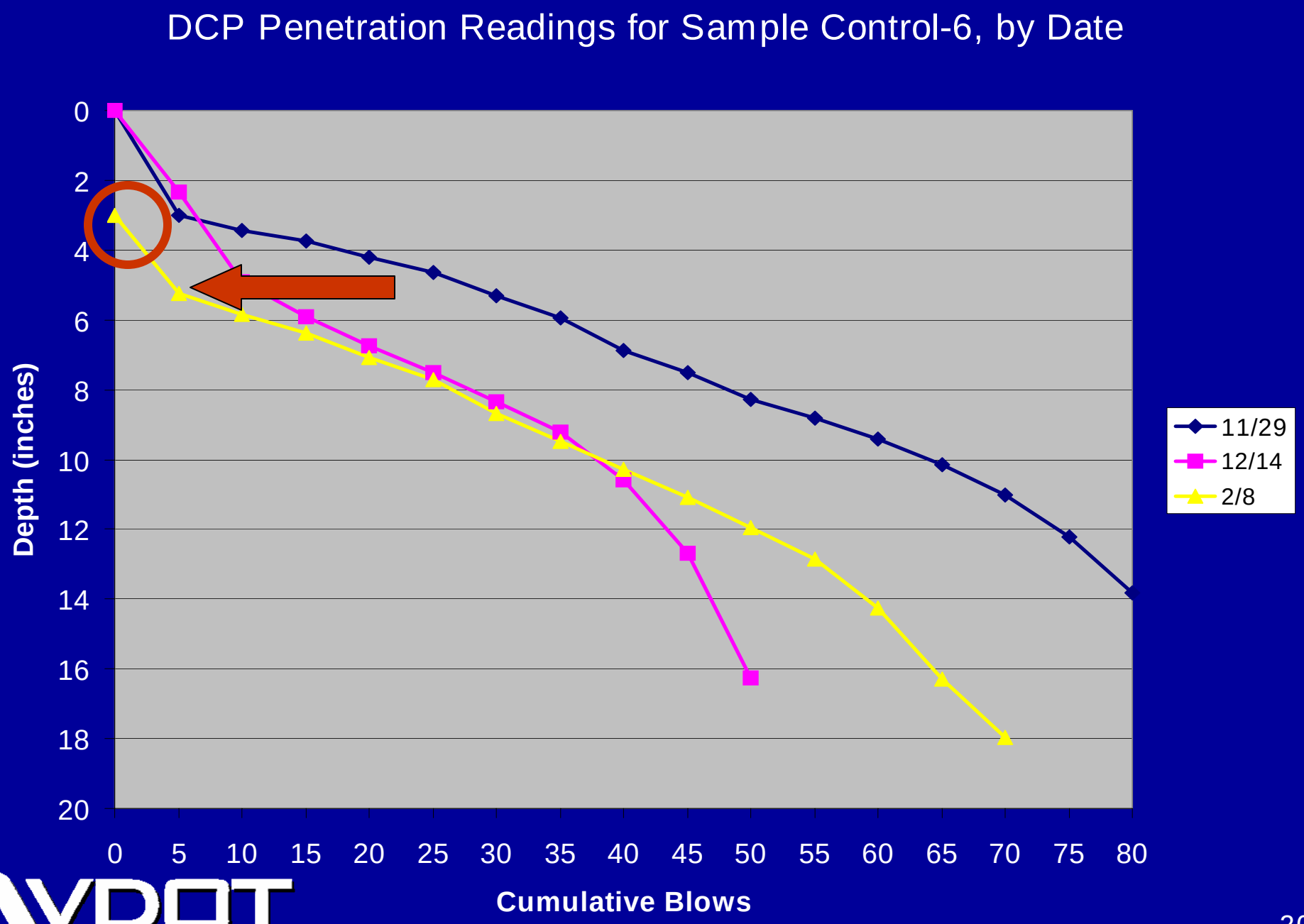
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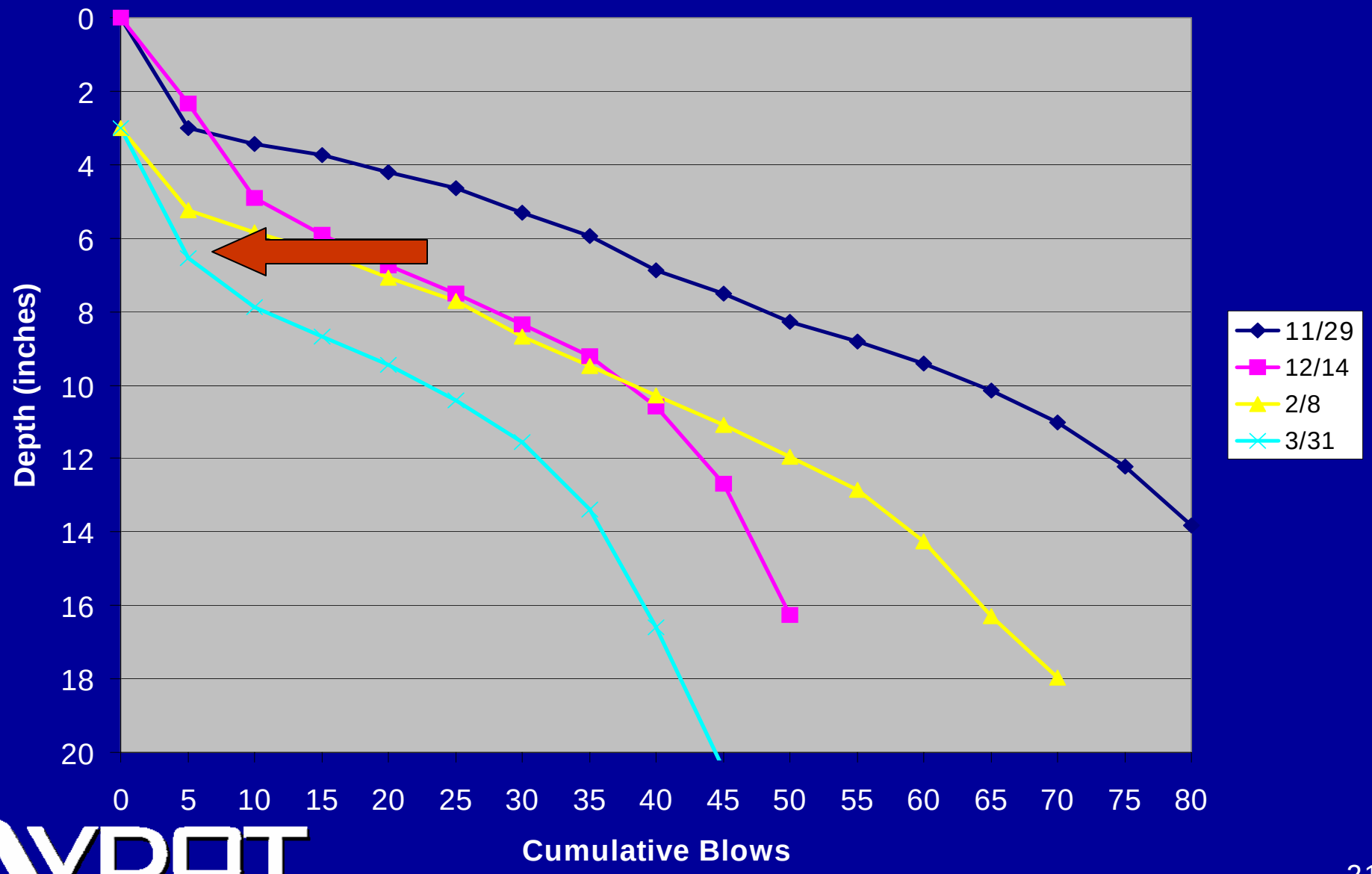
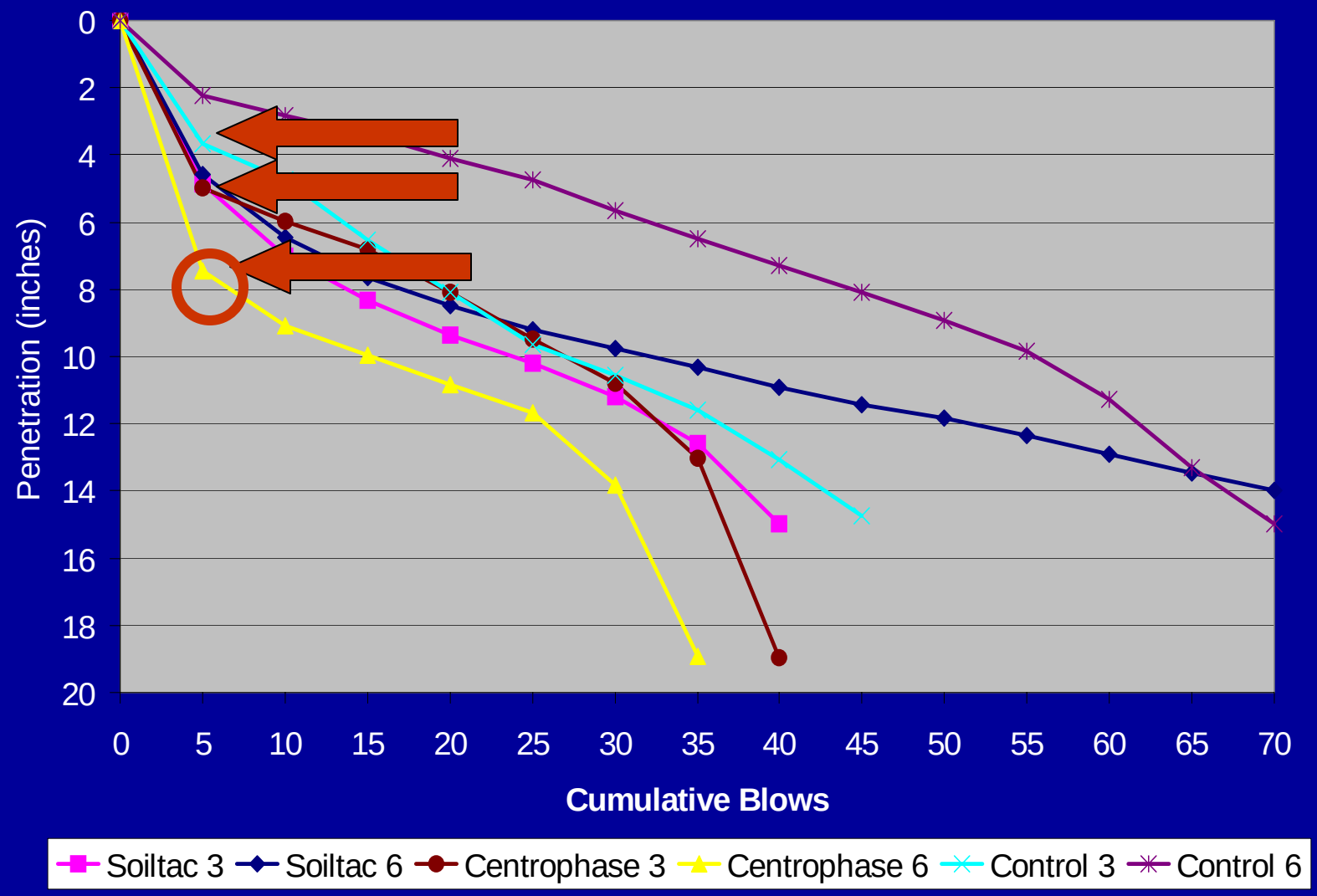


DCP Penetration Data
2/8/2005



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Conclusions

- Equipment normally used for road stabilization is not effective or efficient for stabilization of narrow shoulders.
- Soil stabilizers mixed with crusher run stone do not increase the stiffness or bearing strength.
- Soil stabilizers mixed with crusher run stone do not prolong the period of optimum stiffness and bearing strength of the material.

Conclusions

- Insufficient evidence to determine if soil stabilizers improve a shoulder's short-term resistance to erosion due to the action of water or traffic.
- The cost of using soil stabilizers as short-term surface stabilizers for crusher run stone shoulders is greater than the benefit received.

Recommendations

- Shoulders should be designed for the anticipated traffic load.
- Soil stabilizers should not be used with crushed stone with the intent of improving or prolonging the CBR of shoulder material.
- Consider additional study of soil stabilizers as a short-term solution to shoulder erosion.

Questions

VTRC

VIRGINIA TRANSPORTATION RESEARCH COUNCIL

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Project Limitations

- Project mandated : June 2004
- Report toi GA: January 1, 2005

Installation 9/14/2004

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GeoGauge measures stiffness

- Defined as force over deflection
- The higher the stiffness reading the more resistant the material is to movement (e.g., rutting, corrugation)

The DCP measures penetration

- Inches/hammer blow
- Correlates to CBR or bearing strength
- The less penetration per blow the more weight the material can carry per unit area.

2/8/2005

Soiltac

Centrophase

Control

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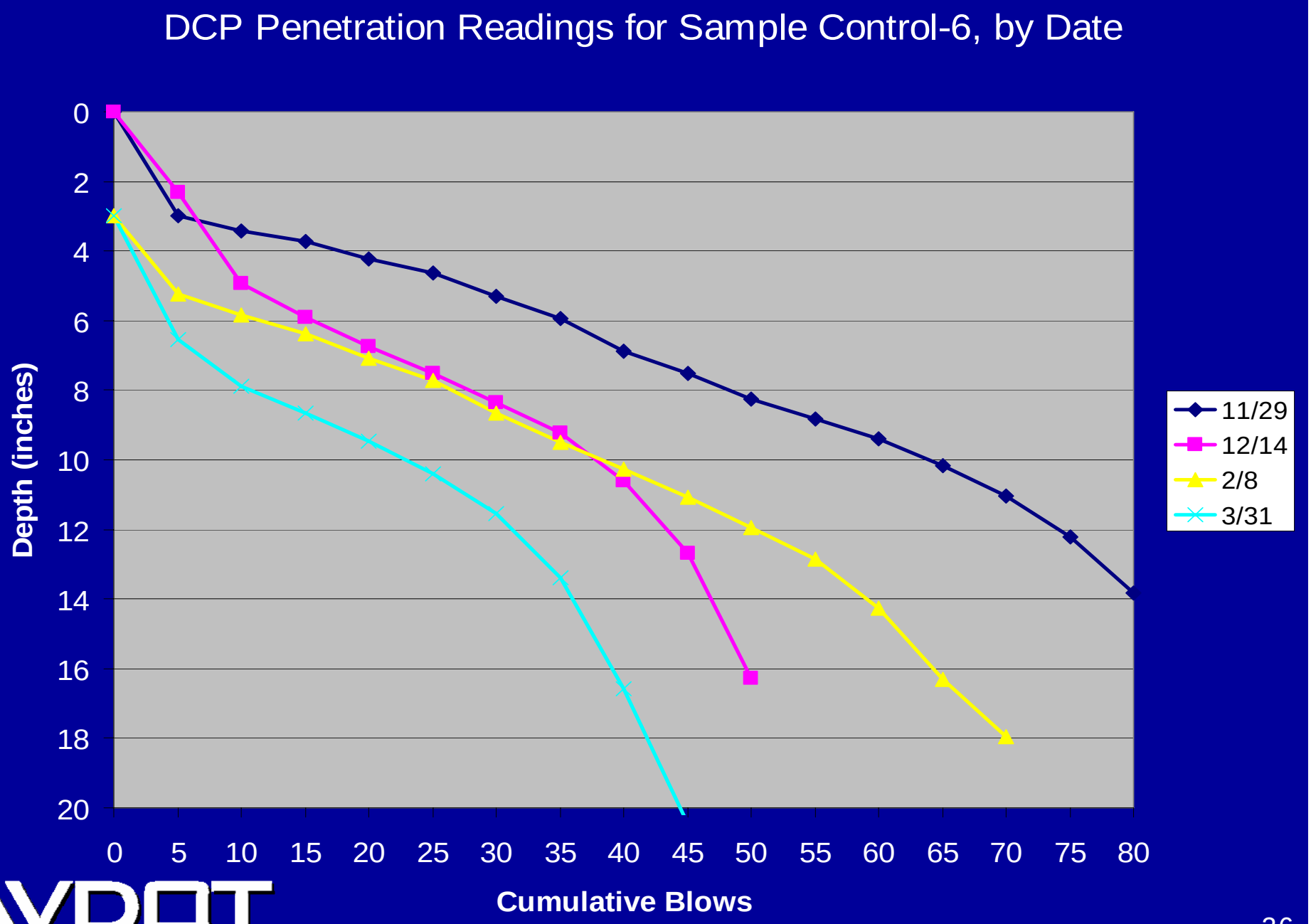
Soiltac Section
2/8/2005

Centophase
2/8/2005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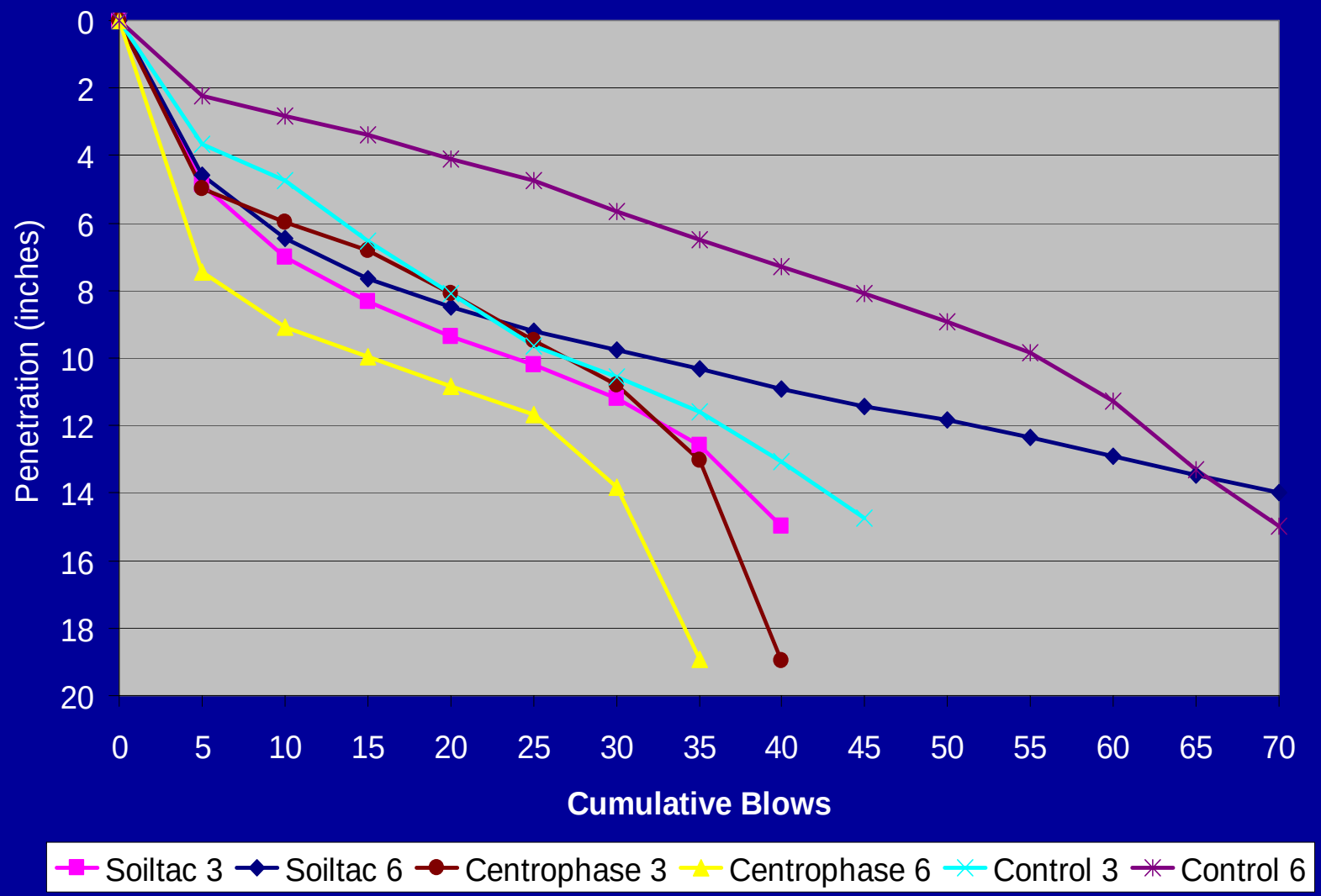
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Cumulative Blows
Soiltac 3
Soiltac 6
Centrophase 3
Centrophase 6
Control 3
Control 6