



Commissioner Training — 2007

1 – Item One Northern Kentucky Water District
2835 Crescent Springs Road
P.O. Box 18640
Erlanger, KY 41018



Commissioner Training — 2007

2 – Item Two Name: Automatic Meter Reading

Sponsor: HDR

Subject Matter: An overview of automatic meter reading and how it relates to the current regional marketplace.



Commissioner Training — 2007

- 3 – Item Three This presentation provides the Board of Commissioners a detailed outline of how automatic meter reading operates, tracks current trends in the utility marketplace, and explores its application at Northern Kentucky Water District.



Commissioner Training — 2007

4 – Item Four One Credit Hour – Copy of Board Minutes showing Commissioners attendance attached

**Northern Kentucky Water District
Board of Commissioners Meeting
May 17, 2007**

A regular meeting of the Board of Commissioners of the Northern Kentucky Water District was held on May 17, 2007 at the District's facility located at 2835 Crescent Springs Road in Erlanger, Kentucky. All Commissioners were present. Also present were Ron Lovan, Bari Joslyn, Richard Harrison, Mark Lofland, Jack Bragg, Bill Wulfeck, Don Gibson, Amy Kramer, Jim Dierig, Mary Carol Wagner, Bob Buhrlage, Chris Wetherell, Frances Robinson, Joanie Goldsberry, Wayne Rogers, Rob Gibbons, Kevin Brian, David Foltz and Charles Pangburn.

Commissioner Koester called the meeting to order.

Commissioner Jackson led those in attendance in the Pledge of Allegiance.

The Board recognized and thanked Wayne Rogers and Rob Gibbons for their many years of faithful and dedicated service to the District upon the occasion of their retirement.

Mr. Lofland and Mr. Wetherell of the District Staff and Mr. Foltz of HDR presented a training session to the Board of Commissioners on automatic meter reading.

The Board reviewed articles published and correspondence received since the last regular Board meeting on April 19, 2007.

On motion of Commissioner Sommerkamp, seconded by Commissioner Wagner, the Board unanimously approved the minutes for the regular Board meeting held on April 19, 2007.

On motion of Commissioner Jackson, seconded by Commissioner Collins, and after discussion, the Board unanimously approved the expenditures of the District for the month of April, 2007.

On motion of Commissioner Sommerkamp, seconded by Commissioner Wagner, and after discussion, the Board unanimously approved the award of the Licking Pike 36-inch water main project to Smith & Brown Contractors, Inc. and authorized the District staff to execute appropriate contract documents.

On motion of Commissioner Collins, seconded by Commissioner Jackson, and after discussion, the Board unanimously approved the award of purchase contracts to the following vendors for the water treatment chemicals indicated and authorized the District staff to execute appropriate contract documents:

50% Caustic Soda

Copper Sulfate

23% Hydrofluorosilicic Acid

Ferric Sulfate

KA Steel Chemicals

Univar USA, Inc.

LCI Ltd.

Kemira Water Solutions, Inc.

Potassium Permanganate
Powdered Activated Carbon
12.5% Sodium Hypochlorite
Corrosion Inhibitor
Alum-Polymer Blend
Ferric-Polymer Blend
Polyaluminum Chloride (Taylor Mill)
Polyaluminum Chloride (Memorial Parkway)

Univar USA, Inc.
NORIT Americas, Inc.
JCI Jones Chemicals, Inc.
Carus Chemcial Company
SAL Chemical Company
SAL Chemical Company
Kemira Water Solutions, Inc.
Kemira Water Solutions, Inc.

The Board reviewed the District's financial reports and Department reports.

Mr. Harrison of the District staff informed the Board that it will be necessary to move certain projects up and other projects back within the District's five year budget in order to accommodate rate case application requirements but that the five year budget total will not change.

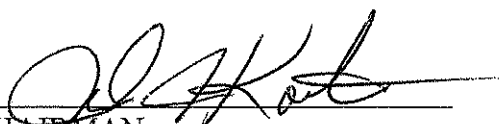
The Board unanimously agreed to move the regular Board meeting in July from July 19, 2007 at 12:30 p.m. to July 26, 2007 at 10:00 a.m.

On motion of Commissioner Collins, seconded by Commissioner Wagner, the Board unanimously agreed to go into executive session under the provisions of KRS 61.810(1)(c) in order to protect the District's legal interests and strategy while discussing proposed litigation.

The Board returned to open session.

Other matters of a general nature were discussed.

There being no further business to come before the Board, the meeting was adjourned.



CHAIRMAN



SECRETARY



Commissioner Training — 2007

5 – Item Five Mr. Dave Foltz

Bio of the presenter attached

Dave Foltz

Principal Consultant
Enterprise Management Solutions, Black & Veatch
(215) 589-4071
FoltzD@bv.com

Mr. Foltz is a Principal Consultant with Black & Veatch, Enterprise Management Services where he specializes in utility business services. His diverse utility background includes extensive management experience in customer service, billing and collection, utility accounting, business unit development, and project/transition management. His management consulting experience includes work in customer service process improvement; revenue enhancement; meter reading technology assessment and procurement; project management of software application implementation; rate setting and cost of capital determination; market and competitive assessment; and financial modeling.

Mr. Foltz has worked with private and municipal utilities for 25 years as both a consultant and service provider. He has managed customer service and billing operations for seven utilities, served on a mayor's advisory board; taken the lead role in several customer and public relations campaigns; developed capital and financial plans; and managed process improvement, and transition management programs.



Commissioner Training — 2007

6 – Item Six Automatic Meter Reading – PowerPoint handouts attached

**Automatic Meter Reading
(AMR)**

Presented to the
Board of Commissioners
Northern Kentucky Water District
May 17, 2007

Presentation Outline

- History of Meter Reading
- What is AMR?
- AMR Marketplace
- Why AMR?
- AMR and NKWD

May 17, 2007


History of Meter Reading

- Manual, Direct
- Manual, Remote
- Touch Read
- Automatic
 - Telephone (land line)
 - Radio Frequency
 - Cellular
 - WiFi
 - Satellite

May 17, 2007

What is AMR?

- Telephone
 - Being phased out
- Radio Frequency
 - Walk
 - Drive-by
 - Fixed



May 17, 2007

What is AMR?

- Radio Frequency
 - Licensed and Unlicensed
 - Transmission modes
 - One-way and two-way communication
 - Battery power supply
 - Antennae (external or integrated)
 - Life expectancy
 - Operational
 - Technological

May 17, 2007

What is AMR?

- Cellular
 - Uses cellular phone network to transmit
- WiFi (Wireless Fidelity)
 - Unlicensed using IEEE 802.11
 - Wireless Local Area Network
- Satellite
 - Uses dedicated satellites to transmit
 - Operates in VHF spectrum

May 17, 2007

AMR Marketplace

- Utilities
 - Public and Private
 - Energy and Water
- Private Companies
 - Pipelines
 - Industrial Complexes

May 17, 2007

AMR Marketplace

- Electric and Gas are Leaders
 - Two-way communication
 - Time-of-day pricing
 - Take advantage of power supply
- Water Moving Ahead
 - Rising rates
 - Leak detection
 - Conservation
 - Demand side management

May 17, 2007

AMR Marketplace

- Water AMR Trends¹
 - Growing in excess of 25% per year
 - Over 3.7 million shipped in 2005
 - Approximately 19 million installed
 - More than 7,000 AMR projects underway
 - Deployed at 25% of utilities with at least 500 customers

1) Source of Information: The Scott Report on AMR Deployments in North America

May 17, 2007

AMR Marketplace

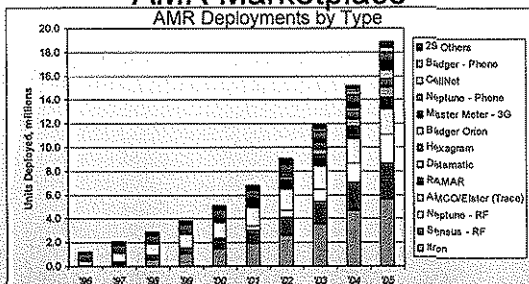
- Water AMR Trends¹
 - Strategic deployments
 - Inaccessible meters
 - Unsafe locations
 - High turn-over premises
 - Move towards monthly meter reading
 - AMR most popular plan for the future

1) Source of information: The Ascent Group, Inc. Benchmarking Meter Reading Performance 2005, and Meter Reading Profiles and Best Practices 2006.

May 17, 2007

AMR Marketplace

AMR Deployments by Type



Source: The Scott Report on AMR Deployments in North America, copyright Cognyst Consulting, L.L.C.

May 17, 2007

AMR Marketplace

Regional AMR Situation

Utility	Number of Meters	Comments
Boone County Water	20,000	Orion radio read except for large, pit meters.
Cincinnati Water	280,000	Neptune Drive-by
Florence Water	8,000	Sensus AMR

May 17, 2007

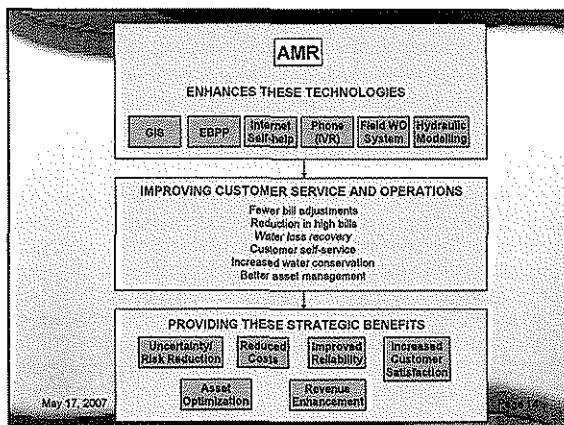
AMR Marketplace

Regional AMR Situation

Utility	Number of Meters	Comments
Hamilton, OH	25,000	AMR
KY American	112,000	Moving towards AMR
Louisville Water	292,000	Moving towards AMR
Nashville-Metro	167,000	Installing Sensus AMR

May 17, 2007

- ## Why AMR?
- More Frequent Meter Reading
 - Conservation and Leak Detection
 - Increased Revenue and Collection
 - Improved Accuracy
 - Better Customer Service
 - Improved Utility Operations
 - Meter Reading Cost Reduction
- May 17, 2007



AMR and NKWD

- Current Meter Reading Situation
 - Predominately Touch Read
 - Approximately 600 AMR units
 - No manual reads
- Evaluation of Alternatives
 - Assessment of current operation
 - Feasibility study



May 17, 2007

AMR and NKWD

- Feasibility Study Results

Scenarios	Planning Horizon	Touch Read	Walk-By	Drive-by	Fixed Network
1 - Current reading frequency and 10-year AMR deployment	10 years	1	3	2	4
	15 years	1	3	2	4
2 - Current reading frequency with 3 year AMR deployment	10 years	1	3	2	4
	15 years	1	4	2	3
3 - Monthly reading with 10-year AMR deployment	10 years	1	4	2	3
	15 years	3	4	1	2
4 - Monthly reading with 3 year AMR deployment	10 years	2	4	1	3
	15 years	3	4	1	2

May 17, 2007

AMR and NKWD

- Current Bid Process
 - AMR deployment
 - One, two and three installation pricing
 - Must read Neptune, Sensus and other meters
 - Shall offer several transmission options
 - Fixed and mobile
 - Power-line
 - WiFi

May 17, 2007



Commissioner Training — 2007

7 – Item Seven No.



Commissioner Training — 2007

1 – Item One Northern Kentucky Water District
2835 Crescent Springs Road
P.O. Box 18640
Erlanger, KY 41018



Commissioner Training — 2007

2 – Item Two Name: SCADA & Instrumentation for Pump Stations & Tanks

Sponsor: Northern Kentucky Water District

Subject Matter: An outline of Supervisory Control & Data Acquisition (SCADA) systems and how they operate.



Commissioner Training — 2007

- 3 – Item Three This presentation will show the Board of Commissioners the different types of SCADA systems and equipment and how they are implemented throughout the Northern Kentucky Water District distribution system.



Commissioner Training — 2007

4 – Item Four One Credit Hour – Copy of Board Minutes showing Commissioners attendance attached

**Northern Kentucky Water District
Board of Commissioners Meeting
June 21, 2007**

A regular meeting of the Board of Commissioners of the Northern Kentucky Water District was held on June 21, 2007 at the District's facility located at 2835 Crescent Springs Road in Erlanger, Kentucky. All Commissioners except Commissioner Collins were present. Also present were Ron Lovan, Bari Joslyn, Richard Harrison, Mark Lofland, Jack Bragg, Don Gibson, Amy Kramer, Jim Dierig, Mary Carol Wagner, Bob Buhrlage, Amy Matraccia, Vince DiGirolamo, Frances Robinson, Shauna Price and Charles Pangburn.

Commissioner Koester called the meeting to order.

Ms. Matraccia of the District staff led those in attendance in the Pledge of Allegiance.

Ms. Matraccia presented a training session to the Commissioners present on SCADA and instrumentation for pump stations and tanks.

Mr. Harrison of the District Staff delivered a presentation to the Commissioners present on the District's Water Shortage Response Plan.

The Commissioners present reviewed articles published and correspondence received since the last regular Board meeting on May 17, 2007.

On motion of Commissioner Wagner, seconded by Commissioner Jackson, the Commissioners present unanimously approved the minutes for the regular Board meeting held on May 17, 2007.

On motion of Commissioner Sommerkamp, seconded by Commissioner Jackson, and after discussion, the Commissioners present unanimously approved the expenditures of the District for the month of May, 2007.

On motion of Commissioner Wagner, seconded by Commissioner Macke, and after discussion, the Commissioners present unanimously agreed to award the Carlisle Avenue water main replacement project to Rector Excavating and to authorize the District staff to execute appropriate contract documents.

On motion of Commissioner Sommerkamp, seconded by Commissioner Wagner, and after discussion, the Commissioners present unanimously agreed to award the Johnson Street water main replacement project to C Square Inc. and to authorize the District staff to execute appropriate contract documents:

Commissioner Collins joined the meeting.

On motion of Commissioner Wagner, seconded by Commissioner Jackson, and after discussion, the Board unanimously agreed to retain the firm of Malcolm Pirnie to provide

engineering services for the Asset Management Program and authorized the District staff to execute appropriate contract documents.

On motion of Commissioner Sommerkamp, seconded by Commissioner Macke, and after discussion, the Board unanimously approved the Kenton County and Campbell County Interlocal Agreements for Link-GIS partnerships and authorized the execution of the Agreements on behalf of the District.

On motion of Commissioner Collins, seconded by Commissioner Sommerkamp, and after discussion, the Board unanimously agreed to award the contract for bill generation and mailing to Literature Fulfillment Services, Inc. and authorized the District staff to execute appropriate contract documents.

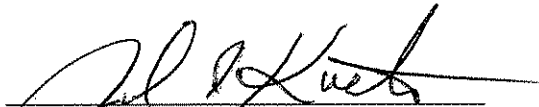
The Board reviewed the District's financial reports and Department reports.

On motion of Commissioner Wagner, seconded by Commissioner Jackson, and after discussion, the Board unanimously agreed to go into executive session under the provisions of KRS 61.810(1)(c) in order to protect the District's legal interests and strategy while discussing pending litigation.

The Board returned to open session.

Other matters of a general nature were discussed.

There being no further business to come before the Board, the meeting was adjourned.


CHAIRMAN


SECRETARY



Commissioner Training — 2007

5 – Item Five Ms. Amy Matraccia, B.S.

Bio of the presenter attached

Amy Matraccia, B.S.

Northern Kentucky Water District
SCADA Administrator
Fort Thomas Treatment Plant
700 Alexandria Pike
Ft. Thomas, KY 41075
(859) 441-0482
matraccia@nkywater.org

Amy Matraccia is the Instrumentation Supervisor for the Northern Kentucky Water District. She has worked for the District since 1990; 6 years in the lab and the last eleven working in the Instrumentation Division. She has a Bachelor of Science in Electronic Engineering Technology from Northern Kentucky University and is currently working on her Master of Science degree at Indiana State University. Amy received a Class IIIA Water Treatment Plant Operator license in 1996. She is a member of the AWWA, KWWOA, and the Instrumentation, Systems, and Automation Society.




Commissioner Training — 2007

- 6 – Item Six SCADA & Instrumentation for Pump Stations & Tanks – PowerPoint handouts attached

**SCADA & Instrumentation for
Pump Stations & Tanks**

Amy Matracia
Northern Kentucky Water District



**Supervisory Control & Data
Acquisition**

System of electronic components that:

- Provides automated control of plants, pump stations and tanks
- Monitors and makes adjustments to ensure water quality
- Monitors and alarms for water tank security
- Compiles data to allow for historical trending

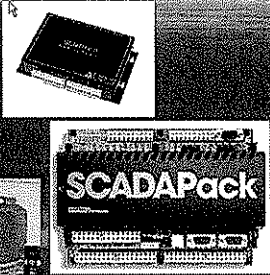
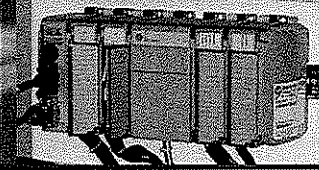
Topics Covered

- Types of SCADA systems
- Types of Flow Meters
- Types of level transmitters
- Other type of instrumentation
- Types of security
- The SCADA system at the Northern Kentucky Water District



Types of SCADA systems

- Large variety of choices
- Simple alarm dialer type system
- Full scale PLC system

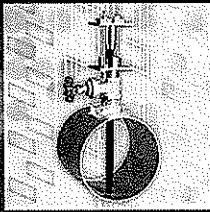
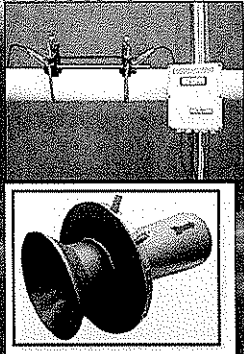



Types of Communication

- Leased phone lines
 1. Dedicated digital line
 2. Truncated phone system
- Radio
 1. Fixed frequency
 2. Spread Spectrum
- Fiber Optic

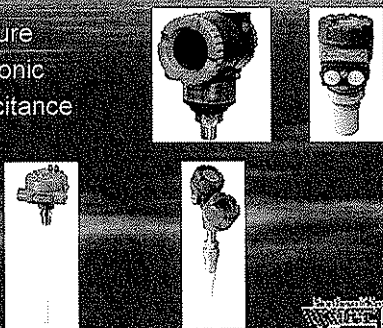
Type of Flow Meters

- Ultrasonic
- Venturi
- Magnetic

Level Transmitters

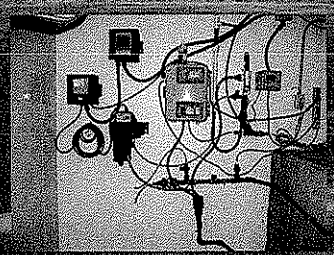
- Pressure
- Ultrasonic
- Capacitance
- Radar



The image shows four different types of level transmitters. Top left: A pressure transmitter with a circular face and a threaded top. Top right: An ultrasonic transmitter with a cylindrical body and a sensor head. Bottom left: A capacitance transmitter with a vertical probe and a circular sensor head. Bottom right: A radar transmitter with a vertical probe and a sensor head. A small logo for 'Water & Power' is visible in the bottom right corner of the slide.

Other type of Instrumentation

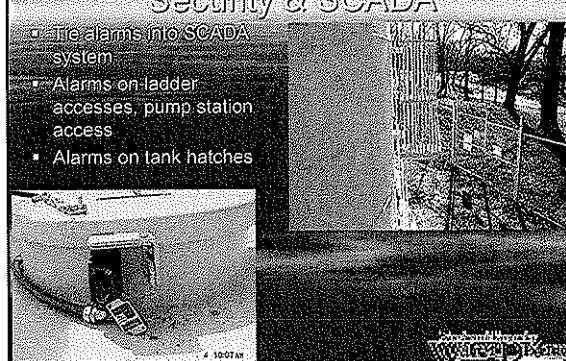
- Water quality analyzers
- Chlorine Residual
- pH
- Turbidity



The image shows a control panel with various instruments and wiring. There are several analog meters, switches, and a complex network of wires. A small logo for 'Water & Power' is visible in the bottom right corner of the slide.

Security & SCADA

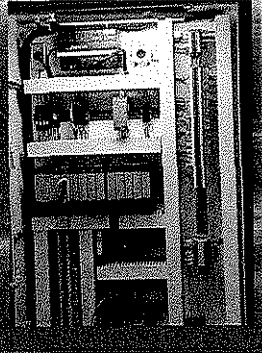
- Tie alarms into SCADA system
- Alarms on ladder accesses, pump station access
- Alarms on tank hatches



The image shows a control panel on the left and a tank hatch with a lock on the right. The control panel has several meters and switches. The tank hatch is a large metal door with a handle and a lock mechanism. A small logo for 'Water & Power' is visible in the bottom right corner of the slide.

SCADA System Backbone

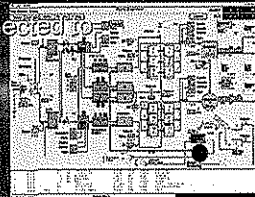
- Programmable Logic Controls
- Each site has remote unit
- FTTP has master controller that performs all high level functions



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User Interface

- 20 Operator Interface Units tied to SCADA System
- Allows operators to control systems and view data
- Collects data for storage
- SCADA system not connected to the outside world



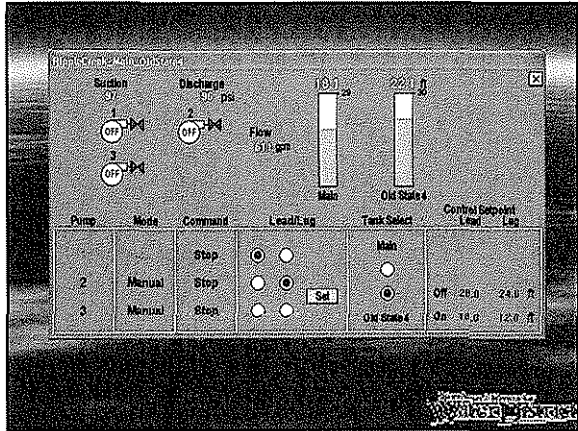
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New Alerts - Alerts

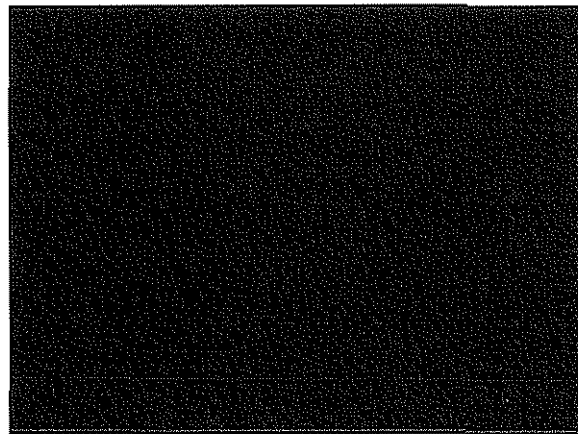
SCADA System Overview

Name	Group	Alert	Severity	Trends	Value	Unit	Min	Max	Set	Unit	Min	Max	Unit	Min	Max	Unit	Min	Max	Unit
001	001	001	001	001	001	001	001	001	001	001	001	001	001	001	001	001	001	001	001
002	002	002	002	002	002	002	002	002	002	002	002	002	002	002	002	002	002	002	002
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Aspect of IT	Corporate IT	Process Control
Anti-Virus	Widely Used	Often difficult/impossible to deploy
Lifetime	3-5 years	5-20 years
Patching	Frequent (often daily)	Slow (requires vendor approval)
Change	Frequent	Rare
Time criticality	Delays OK	Critical, often safety dependent
Availability	Outages OK(overnight)	24/7/365
Security Skills & awareness	Fairly good	Poor
Security Testing	Widely used	Must be used with care
Physical Security	Usually secure and manned	Often remote and unmanned



Commissioner Training — 2007

7 – Item Seven No.



Commissioner Training — 2007

1 – Item One Northern Kentucky Water District
2835 Crescent Springs Road
P.O. Box 18640
Erlanger, KY 41018



Commissioner Training — 2007

2 – Item Two

Name: The Value of Engineering Reconnaissance in the Selection of Collection/Distribution Pipeline Alignments and Structure Locations

Sponsor: Thelen Associates, Inc.

Subject Matter: To illustrate the importance of engineering reconnaissance and its role in the selection and development of new pipeline installations.



Commissioner Training — 2007

- 3 – Item Three This presentation will show the Board of Commissioners how engineering reconnaissance works during the selection and design process to identify suitably stable areas for the construction of new collection/distribution pipelines.



Commissioner Training — 2007

- 4 – Item Four One Credit Hour – Copy of Board Minutes showing Commissioners attendance to be attached after September 20, 2007 meeting.



Commissioner Training — 2007

5 – Item Five Mr. Theodore W. Vogelpohl, P.E.

Bio of the presenter attached

THELEN

THEODORE W. VOGELPOHL, P.E.
VICE PRESIDENT - ENGINEERING
PRINCIPAL GEOTECHNICAL ENGINEER

Education:

BA, 1978, Physics, Thomas More College
BSCE, 1979, Civil Engineering, University of Kentucky
MSCE, 1980, Geotechnical Engineering, University of Michigan

Registration:

Registered Professional Engineer in Kentucky, Ohio and Indiana

Experience:

1977 - 1978, Engineering Aide, Kentucky Department of Transportation
1979 - 1980, Engineering Aide, Thelen Associates, Inc.
1980 - 1985, Project Engineer, Shannon & Wilson, Inc.
1985 - 1997, Senior Geotechnical Engineer, Thelen Associates, Inc.
1997 - 1999, Chief Geotechnical Engineer, Thelen Associates, Inc.
1999 - 2005, Vice President - Engineering & Chief Geotechnical Engineer, Thelen Associates, Inc.
2005 to present, Vice President - Engineering & Principal Geotechnical Engineer, Thelen Associates, Inc.

Qualifications:

Mr. Vogelpohl has more than 27 years experience in the field of Civil and Geotechnical Engineering. His project experience is broad-based, including water and wastewater distribution and collection pipelines; highway and bridge design; single- and multi-family residential developments; commercial (including high-rise) buildings with shallow and deep foundation systems; landslide stabilizations; earth dams; airport runways; deep excavation support systems; water and wastewater treatment plants and pump stations; and sports stadiums. One of Mr. Vogelpohl's areas of specialization is the geotechnical design and construction of buried pipelines. He has provided engineering and consulting services for more than 150 pipeline projects in rural and urban settings with pipe diameters ranging from 8 inches to 102 inches. His project involvement has ranged from field testing and engineering to completion of geotechnical design reports and management of construction inspections. Presently, he has technical responsibility for the full range of the firm's geotechnical projects, as well as project budget management, review of staff tasks, proposal preparation and building client relationships.

Representative Projects:

Allen Fork Sewer and Pump Station, Burlington, Boone County, Kentucky
42-inch Raw Water Intake Main, Ft. Thomas, Kentucky
Cincinnati Reds Great American Ballpark, Hamilton County, Ohio
Ohio River Raw Water Intake Structure, Ft. Thomas, Kentucky
Eastern Regional Sewer Outfall and Wastewater Treatment Plant, Campbell County, Kentucky
Hands Pike Water Main, Kenton County, Kentucky
Highland Pike Landslide, Kenton County, Kentucky
IRS Service Tower, Covington, Kentucky
Cardinal Hill Secondary Water Supply System, Louisville, Kentucky
Lakeview Interceptor Sewer, Ft. Wright, Kentucky
Narrows Road Diversion Pump Station, Kenton County, Kentucky
National Underground Railroad Freedom Center Parking Garage, Cincinnati, Ohio
Newport Interconnect Project Landslide and Water Main, Newport, Kentucky
Ohio River Pipeline Crossing, Cincinnati, Ohio and Boone County, Kentucky
Paul Brown Stadium, Hamilton County, Ohio
Sanitation District No. 1 Rivershore Plant Landslide, Boone County, Kentucky
Taylor Mill Water Treatment Plant, Taylor Mill, Kentucky
U.S. 27 Water Main, Alexandria, Kentucky
Western Regional Wastewater Treatment Plant, Boone County, Kentucky
Sub-District C Water Distribution System, Kenton County, Kentucky



Commissioner Training — 2007

- 6 – Item Six The Value of Engineering Reconnaissance in the Selection of
Collection/Distribution Pipeline Alignments and Structure Locations –
PowerPoint handouts attached

The Value of Engineering Reconnaissance in the Selection of Collection/Distribution Pipeline Alignments and Structure Locations

Presented By: Theodore W. Vogelpohl, P.E.
Principal Geotechnical Engineer
Vice President - Thelen Associates, Inc.



Thursday, September 20, 2007

Introduction

A thorough engineering reconnaissance is one of many valuable tools to be used in the selection, design and construction of collection/distribution pipeline alignments and structure locations. Its value is in the elimination and avoidance of alignments/locations that may have fatal flaws, such as those associated with major ground instability, and the identification of critical areas of stability/constructability to be addressed with more detailed subsurface exploration and design.



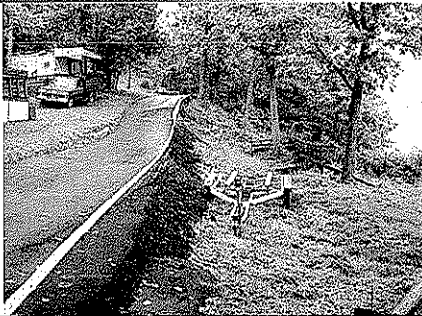
Factors Considered in the Engineering Reconnaissance

- Effect of existing ground stability on pipelines and structures
- Effect of construction of pipelines and structures on the stability of the existing ground and on the stability of existing structures and infrastructure
- Indications of topography, soil and bedrock types and other factors that affect constructability of pipelines and structures

Factors Considered in the Engineering Reconnaissance

Effect of existing ground stability on pipelines and structures

Effect of Existing Ground Stability on Pipelines and Structures



Effect of Existing Ground Stability on Pipelines and Structures



Effect of Existing Ground Stability on Pipelines and Structures

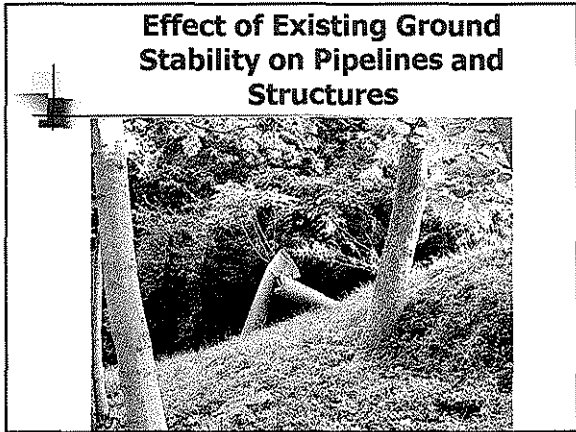


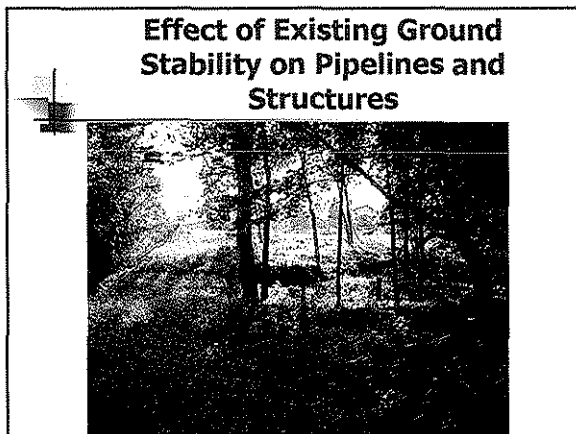
Effect of Existing Ground Stability on Pipelines and Structures

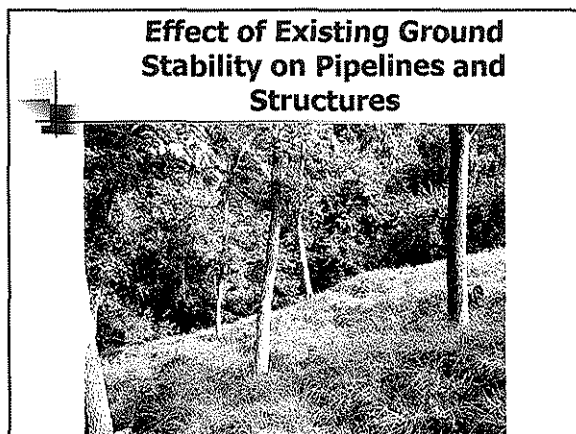


Effect of Existing Ground Stability on Pipelines and Structures









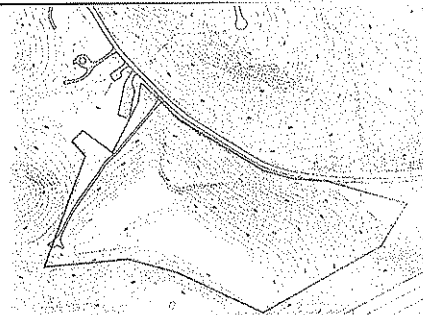
Effect of Existing Ground Stability on Pipelines and Structures



Effect of Existing Ground Stability on Pipelines and Structures



Effect of Existing Ground Stability on Pipelines and Structures



Effect of Existing Ground Stability on Pipelines and Structures



Factors Considered in the Engineering Reconnaissance

Effect of construction of pipelines and structures on the stability of the existing ground and on the stability of existing structures and infrastructure

Effect of Construction of Pipelines and Structures on the Stability of Existing Structures and Infrastructure



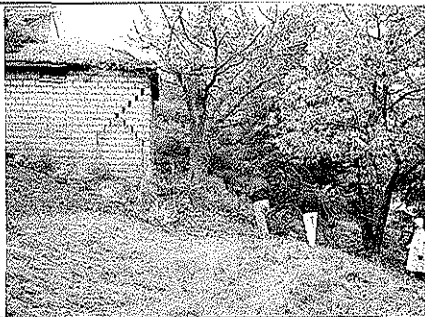
Effect of Construction of Pipelines and Structures on the Stability of Existing Structures and Infrastructure



Effect of Construction of Pipelines and Structures on the Stability of Existing Structures and Infrastructure



Effect of Construction of Pipelines and Structures on the Stability of Existing Structures and Infrastructure



Effect of Construction of Pipelines and Structures on the Stability of Existing Structures and Infrastructure



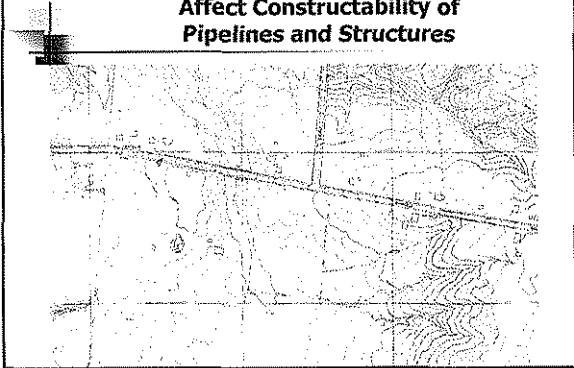
Effect of Construction of Pipelines and Structures on the Stability of Existing Structures and Infrastructure



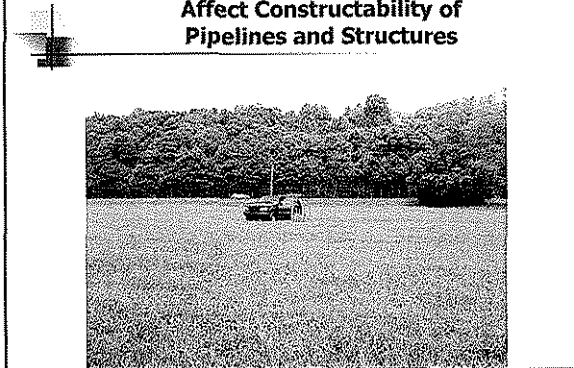
Factors Considered in the Engineering Reconnaissance

Indications of topography, soil and bedrock types and other factors that affect constructability of pipelines and structures

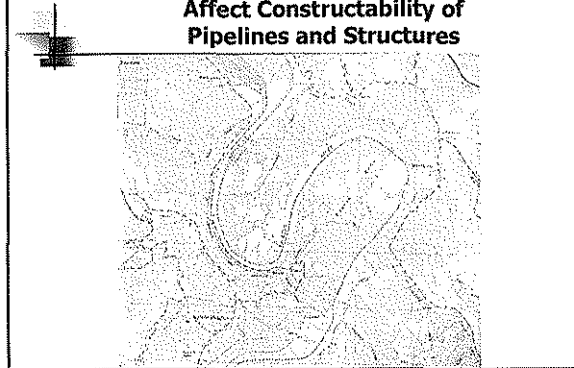
**Indications of Topography, Soil and
Bedrock Types and Other Factors that
Affect Constructability of
Pipelines and Structures**

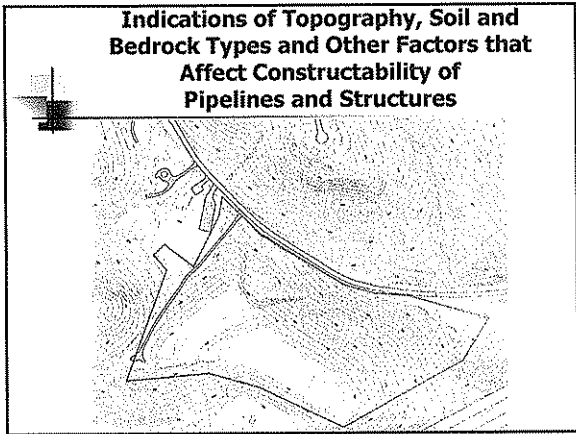


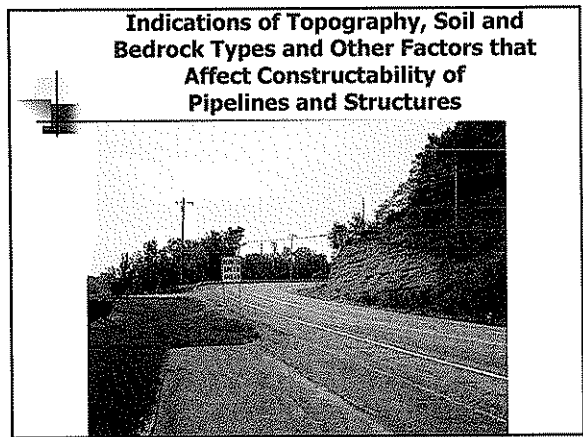
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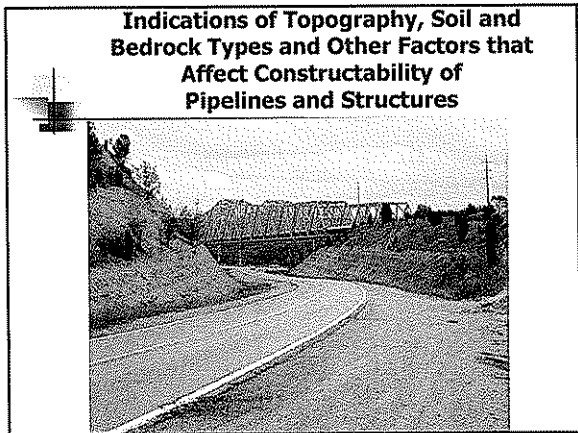


**Indications of Topography, Soil and
Bedrock Types and Other Factors that
Affect Constructability of
Pipelines and Structures**









**Indications of Topography, Soil and
Bedrock Types and Other Factors that
Affect Constructability of
Pipelines and Structures**



**Indications of Topography, Soil and
Bedrock Types and Other Factors that
Affect Constructability of
Pipelines and Structures**



**The Value of Engineering
Reconnaissance in the Selection of
Collection/Distribution Pipeline
Alignments and Structure Locations**

Presented By: Theodore W. Vogelpohl, P.E.
Principal Geotechnical Engineer
Vice President - Thelen Associates, Inc.



Thursday, September 20, 2007



Commissioner Training — 2007

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