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Problem and Preferred Management Practices Identification Workshop

Topical Report

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DISCLAIMER

ABSTRACT

Key oil producers in the Appalachian basin were invited to attend a "Problem and Preferred Management Practices Workshop" in Morgantown, WV to experience technology transfer and share their views on technical problems and the current preferred practices being employed to solve those problems. The goals of the workshop were to introduce these key oil players with DOE's new Preferred Upstream Management Practices (PUMP) program; to explain the proposed two-year project that DOE has funded in the Appalachian basin; to transfer technology; to identify technical problems and best management practices; and to recruit members for a Preferred Management Practices Council. A keynote address set the tone for the workshop by addressing the broad picture of the future for the oil industry in the Appalachian basin, with an emphasis on the necessity of developing and implementing new technology and practices.

Technology was transferred through a series of short, focused presentations related to options for cost effective stimulation, artificial lift techniques, brine disposal, monitoring production practices, identifying and accessing behind pipe oil reserves and new technology to produce nitrogen on site for enhanced recovery operations.

Three breakout sessions were held to allow participants the opportunity to identify technical problems and the best practices in use to address them. One group concluded that digital oil and gas data in a standard format for all Appalachian basin states is highly desirable, and that oil field personnel (i.e., well tenders) should be trained and educated to give them an appreciation for data and its importance. The reservoir engineering group identified the need to be able to isolate zones to determine productive units, to model the reservoir and to integrate data of different types from diverse sources. It is vital to be able to access data in company files and reports, and in government reports, but first it may be necessary to verify that these data exist, and then to integrate them into a useful database.

Drill rig safety and a knowledge of safe drilling practices was the most important recommendation of the third breakout group, which again underlined the need for better training of oil field personnel. Potential solutions include developing a well control or well safety school, and a workshop highlighting best drilling practices. It was suggested that perhaps both workshops could be developed and hosted by the Appalachian basin's Regional Lead Organization for the Petroleum Technology Transfer Council

Participants were introduced to the Preferred Management Practices (PMP) Council and the website that will be developed during this project, and invited to participate in the development of both, and then asked to fill out and submit a workshop evaluation form.

Fifty percent of the industry participants submitted workshop evaluation forms on which they expressed their views on the importance of developing technology and transferring this technology to independents. Of immediate importance was the response from a majority of the producers present that they would be willing to participate on the PMP Council and would welcome in-house interviews to further aid in the identification of preferred practices.

TABLE OF CONTENTS

Problem and Preferred Management Practices Identification Workshop
January 22, 2002; Morgantown, WV

WORKSHOP REPORT

WORKSHOP GOALS

There were several goals for this workshop: to introduce key players in the Appalachian basin oil industry to DOE's new Preferred Upstream Management Practices (PUMP) program; to explain the various elements of our two-year project in detail; to transfer technology through a series of short, invited talks; to identify technical problems and best management practices; and to recruit members for our Preferred Management Practices (PMP) Council.

Our initial challenge, therefore, was to identify and recruit the speakers we needed to accomplish what we envisioned, and to enlist the aid of industry volunteers to serve as breakout session facilitators. Staff members were assigned to each facilitator as a scribe. However, an equally challenging task was to identify the key oil players in the region and encourage their participation in the workshop.

The state geological surveys of Kentucky, Ohio, Pennsylvania and West Virginia provided us with lists of the largest oil producers in their states and a contact person for each. We collated these lists to eliminate duplications and sent out invitations to 80 key individuals. In the invitation letter, we explained the PUMP program, our contractual effort, and the importance of oil producers being willing to cooperate with us in this endeavor.

The format we conceived for the workshop would begin with brief introductory remarks about the PUMP program, and would be followed by a keynote speaker or speakers, and then a series of short, technology-oriented talks. This sequence was designed to stimulate the thought processes of our invited guests prior to the afternoon breakout sessions, during which we hoped to receive input from these key oil players.

The purpose of having a keynote address was to set the big picture in regard to the current state of the oil industry in the basin and what we can expect in the near future. We were indeed fortunate that not one but two high-profile speakers accepted our invitation to become involved in this program. Virginia Lazenby, Chairman of the Bretangne Group, and Stan Pickens, recently retired Chairman and CEO of Dominion Appalachian Development, Inc, both are well-known in the Appalachian basin, with a solid background in the Independent Petroleum Association of America and their respective state oil and gas associations. Unfortunately, Mr. Pickens had to withdraw at the last moment to meet with President Bush and a small group of independent producers in Charleston, WV the same day as our workshop.

We identified a group of technology speakers, and invited seven, hoping to get five or six. However, all seven accepted our invitation to present a 20-minute summary of a technology that they have used to solve a technical problem related to oil production in this basin.

TECHNOLOGY TRANSFERRED

Invited speakers for the technology transfer portion of the workshop included Lance Cole, the Petroleum Technology Transfer Council's (PTTC) Project Manager from Tulsa, OK; Kevin Smith, Chairman of PTTC's Appalachian Region Producer Advisory Group from Oxford Oil, Zanesville, OH; Tim Knobloch, James Engineering, Marietta, OH; Steve Smith, Airlift Services, Anderson, IN; Ali Rdissi, Carthage Software, Inc, McKees Rocks, PA; Bernie Miller, Bretagne Group, Lexington, KY; and Carl Starr, CNR/NiSource, Charleston, WV.

Lance Cole's presentation on "*Solutions from the Field"* provided participants with a brief overview of the Petroleum Technology Transfer Council, and some of the available success stories published by PTTC in their technology transfer workshop summaries, newsletter articles, the Emerging Technologies Energy Conference and the Petroleum Technology Digest. Thirty-five case studies have been published in the Petroleum Technology Digest, and Cole emphasized four of these: "Solid Propellants Provide Cost-Effective Stimulation;" "Biological Option for Repairing Polymer-Induced (Fracs) Formation Damage;" "Walking-Beam Operated Compressor;" and "Surface Geochemical Survey Adds Exploration Confidence." Brief case studies were presented on each of these technologies.

Cole suggested that published Workshop Summaries are "the next best thing to being there" and are a source of valuable information to oil producers. He summarized five of these, including: "Upper Devonian Sandstone Oil Reservoir;" "Surface Exploration in Mature Reservoirs;" "Recognizing Reservoir Compartmentalization;" " Artificial Lift Basics and Advancements;" and "Wellbore Management." All of these have direct application in this basin. The conclusion was that operators should not be afraid to look outside their own area; they can learn from other's successes - and failures - so they, in turn, should be willing to share their experiences.

Kevin Smith actually made two presentations, one on "*Brine Disposal in Ohio,*" which described successful, and relatively inexpensive, ways his company has found to dispose of brines produced with their oil, and a second on "*Accessing Uphole Reserves Behind Pipe,*" during which he demonstrated a quick and inexpensive method to identify and evaluate uphole reserves behind pipe in their productive oil fields.

Tim Knobloch's presentation, "*Production Monitoring Practices*," addressed the necessity of maximizing production to maximize profitability from stripper wells, and problems that interfere with attempts to maximize production. These wells often have technical problems that go undetected, unless someone is closely monitoring production rates and notices an abnormal decline. Knobloch discussed four methods of monitoring production: pumpers, tabular monitoring, percentage rule and computerized systems. Pumper monitoring relies on the pumper to notice and report changes, but because this is not part of his normal duties, and it is not tied to a production goal, this method often fails. Tabular monitoring compares the current month production to the previous month's, and although it is better than the pumper method, it fails due to insufficient information, the failure once again to establish production goals and because gradual declines can be missed. The percentage rule method is similar to the tabular method in that the current month's production is compared to the previous month's. It commonly fails because unless the downward variance exceeds a certain number set by rule, perhaps 10%, no

action is taken. Wells could decline over a period of many months at a rate slightly less than the set rule and nothing would be reported as a problem.

Knobloch suggested that the best method to use is a computer-based system which allows real time data to be collected and manipulated in a timely manner. It may be expensive to implement, thus making it less attractive to small independents and to companies whose goals are to gather data rather than to identify and act on production anomalies noted in the data. The recommended "Priority" program succeeds because it compares actual production to forecasted production volumes, highlights only those wells that require attention, allows managers to prioritize production deficits, provides the necessary information and sets accountability to the field level of personnel. This program requires a complete production history, formation type decline curves, and Microsoft Excel to operate. Current production is plotted and production goals are established and entered into Priority. As actual monthly production is added, programs are run that identify and sort by wells the amount of production lost. Wells on the short list of those with the most lost production are then selected for action.

Steve Smith and several of his co-workers from Airlift Services presented a talk and video on "*An Innovative Air Lift System for Oil Wells*" that they have developed, and cited examples from the field. The system is capable of lifting up to 25 barrels of fluid a day from a maximum depth of 1500 feet. The depth and volume limitations are offset to a large extent by a system that eliminates corrosion problems, and does not require a beam, motor or pulleys. Labor costs also are reduced because fewer pumpers are required.

The compressed air system is self-contained, with no moving parts above ground, and only plastic, stainless steel and brass components are placed in the well. A 1000 foot well requires up to four stages. The system has been installed in ten wells to date. Sand production does not seem to be a problem.

Ali Rdissi presented an option for collecting and monitoring stripper production data using a hand-held computer. His talk, titled "*Real-Time Monitoring System to Improve Production and Accuracy at the Wellsite*," suggested using a device that has been proven to eliminate many of the common errors made in the field. In addition, the hand-held computer has many applications, including oil and gas production, brine hauling, creating a daily activity log, compressor monitoring, drilling and completion data gathering and recording truck mileage. Rdissi then showed examples of common problems associated with field data gathering, and the remedy for each using the hand held computer. Entering accurate gage measurements, and following them with error-free calculations, goes a long way to diagnosing production problems in the field while still at the well site. Thus, a hand-held computer can assist the well tender in solving problems and increasing production while still out in the field.

Bernie Miller discussed a new "*Membrane Technology to Produce On-Site Nitrogen for Enhanced Oil Recovery*" that his company has developed. An on-site nitrogen membrane unit based on the relative permeation rates of various gases is used. This high-pressure, portable nitrogen generator produces nitrogen for use in the company's huff and puff enhanced recovery process. Several examples from eastern Kentucky were discussed, illustrating the increase in oil production attributed to the injection of nitrogen produced with this unit.

Carl Starr presentation on "*Pumping Wells in Appalachia: Problems and Remedies*," described efforts by CNR/NiSource to pump oil wells that have low gas-to-fluid ratios.

BREAKOUT SESSIONS

Six breakout sessions originally were offered, but these were reduced to three, based on the expressed interest of the workshop participants, allowing a longer time for each group to fully explore their topic. The three topics that were addressed by the groups were "Data Collection - Use, Needs, Automation and Management," "Reservoir Characterization, Heterogeneity and Compartmentalization" and Drilling, Stimulation and Production."

Lance Cole, Project Manager with PTTC, volunteered to be a Facilitator for the breakout session on data collection, with Lee Avary, Head of the Oil and Gas group at the West Virginia Geological Survey assisting him as a Scribe.

The group concluded that digital data in a standard format for all states is highly desirable. Important elements include accurate x, y, and z location and elevation data, and production and reservoir data that can be used to identify underperforming wells and in-fill drilling and up-hole completion potential more cost-effectively. Basic operational data such as tank fluid levels need to be collected in a more automated manner. This goes hand-in-hand with improving education for well tenders in what the data mean, so they can readily realize when a well is under-performing. Also, additional education for well tenders about environmental and safety regulations and practices is needed. Existing resources such as the generic safety manual available from the Ohio Oil and Gas Association and materials that the Oklahoma Marginal Well Commission has developed should be used where appropriate.

Other data issues identified are paper versus digital format, location and condition of old records, availability of information on very old plugged and abandoned wells, and cost-effective and efficient ways to gather data used to make decisions.

High potential reservoirs should be evaluated and prioritized on a regional scale. Interstate stratigraphic nomenclature inconsistencies need to be addressed (and many were in the Gas Atlas). Making some of these types of data available via the Internet would be useful.

Another data issue is consolidated reporting of such things as annual production data. Ohio has a consolidated reporting system; currently West Virginia has a variety of different reports required for the tax department and Office of Oil and Gas. There is a bill currently in the West Virginia legislature which might simplify these reporting requirements.

Joe Frantz, Schlumberger-Holditch in Pittsburgh, agreed to serve as the Facilitator for the breakout group that examined reservoir characterization and heterogeneity, with Michael Hohn, Senior Research Geologist with the West Virginia Geological Survey, as a Scribe.

The breakout group on reservoir engineering considered best practices from the viewpoints of what works, what does not work and future needs. Current practice in the

Appalachian basin includes using a standard suite of open hole logs, usually gamma-ray and density; cores, both whole core and side wall; and pressure build-up tests in old fields. Examples of methods used rarely, if at all, include dipmeter logs and nuclear magnetic resonance (MRI) for saturation and permeability. Taking cores in new wells is becomingly increasingly rare despite the information that can be gleaned from them.

The group agreed that it is important to be able to isolate zones to determine productive units, to carry out geologic modeling, and to integrate data of different types from disparate sources. It is vital to have access to existing oil field information on specific fields, including company and government reports. Group members voiced the suspicion that many reports lie unused in company files. Information must be made available and integrated in some way. The suggestion was made that regional experts be interviewed to identify sources of data. One advantage of going into older fields is the availability of production histories.

Reservoir imaging techniques such as cross-well tomography, magnetic surveys and surface geochemical surveys have not found wide use in the basin. Some seismic surveys have been done, however.

Needs identified by the group were methods for characterizing isolated wells, or groups of wells within a field, i.e. situations when a company owns small portions of a field and must make decisions and plans based on limited data. A second need is for published case studies.

Suggestions for future workshops and initiatives were a database of reservoir characterization efforts in the basin, and a basin-wide repository of reservoir data.

Kevin Smith, Chairman of PTTC's Appalachian Region Producer Advisory Group, facilitated the group discussing dealing with drilling, stimulation and production problems and practices, with Ron McDowell, Senior Research Geologist with the West Virginia Geological Survey, as his Scribe.

A survey of the breakout group participants indicated a collective experience with the topic matter through company activities in Kentucky, New York, Ohio, Pennsylvania, Tennessee and West Virginia.

The group ranked the following drilling problems in the order of their importance:

1) Drill rig safety and knowledge of safe drilling practices
2) Region-wide lack of drilling personnel – trained or otherwise
3) Existing equipment is aging and possibly poorly maintained – new equipment unavailable
4) Permitting and regulatory process becoming increasingly complex
5) Regional problem with drillers unprepared for high pressure/high volume flow from new wells

Potential solutions to personnel problems identified by the group included: guaranteed work contracts (length of employment specified at time of hiring); "mentoring," or apprenticeship of new hires under the supervision of experienced personnel; cash incentives to

stay with the company in the form of bonuses; use of relief crews and guaranteed time off; automation of some of the "repeatable" tasks on the drill site; setting up a "steady" drilling program throughout the year to minimize rig downtime and personnel turnover; and paying a "subsidy," or assistance to drilling contractors to help them stay in business during slow periods.

Potential solutions to safety problems included: developing a well control or well safety school, perhaps under the auspices of PTTC; and developing and hosting a workshop highlighting "best drilling practices."

Completion problems, again ranked in order of their importance by the group, included:

1) Difficulties with "accurate," multistage completions
    a) how to identify "best" zones for completion
    b) how to identify zones to be treated
    c) well or production testing
2) Cementing - particularly in deep wells with long drill string leading to excessive cement heights for production string
3) Unsafe or poorly maintained service rigs
4) Stimulation difficulties
    a) incompatibility between fluids and formation
    b) difficulty in determining perforation density
    c) difficulty with proppant – type and amount
5) Reservoir-specific problems
    a) accurate identification of lithology
    b) selection of best completion technique for fractured reservoirs

Potential solutions to the cementing problems are: using foam cement; addition of microspheres to cement; and "stage" cementing. Participants noted that any solution must be both cost effective and feasible in an engineering sense.

PREFERRED MANAGEMENT PRACTICES COUNCIL AND WEB SITE

The following comments regarding the formation of a Preferred Management Council and the creation of an interactive web site were made to the group near the conclusion of the workshop.

The Preferred Management Practices (PMP) Council will be an industry - government partnership that will oversee the compilation of preferred management practices and continue on beyond the two-year duration of the current contract. It will be composed of oil producers or members of service companies currently on PTTC's Appalachian Region Producer Advisory Group, the State Geologists and Department Chairs that currently make up the Advisory Board of the Appalachian Oil and Natural Gas Research Consortium, and individuals from the major oil players in the region who are interested in becoming involved. Targeted members are those oil producers who will consider contributing their experience and information to the data base being developed for the web site and will continue to help us identify preferred practices in this and other regions.

The two main objectives in creating the Council are: to assure the effectiveness of the web site and the significance of identified preferred management practices through a review of the design and content of the website; and to plan the procedure for continuation of the program beyond the current contract.

The role of the Council and Council members is to: help in the PMP identification process; contribute to the data base and information on the interactive web site; review and rank the PMPs and highlight those that have proven to be the most efficient in the region; document the success of applying these PMPs; select other, currently underutilized PMPs that have the most potential; review the content and design of the web site; and plan the activities of the Council beyond the current contract. Future planning will involve updating the web site, continued identification of PMPs and documentation of case histories and success stories.

Our goal in creating and maintaining an interactive web site is to produce a product that is a valuable resource for oil producers who wish to match preferred management practices with problems they encounter in drilling, completion, enhanced recovery and production practices. The contents of the web site will include case studies of PMPs in the region and relevant studies from other regions, and a data base of Appalachian basin oil fields. This data base will contain information on the geologic structure in a field, depositional environment of the reservoir rock, style and scale of heterogeneity in the field, permeability and permeability distribution in a field, porosity, cumulative production and PMPs determined during this project. Data currently in DOE's Total Oil Recovery Information System (TORIS) data base will be incorporated directly, or linked to an on-line version.

Users will be able to search the data base of PMPs using a variety of geologic and engineering parameters, such as depositional environment, type of heterogeneity or permeability. A search engine will be provided.

A set of HTML-formatted pages will be written to document case studies. In some cases, new information will be added to published case studies. These studies can be searched and accessed on-line.

PARTICIPANT COMMENTS ON WORKSHOP EVALUATION FORMS

Thirty eight individuals signed in for the workshop, of which six were project team members. Of the remaining 32, exactly half filled out and submitted evaluation forms.

We asked our participants to respond to seven questions dealing with who they were, whether they developed or used technology, if they thought the workshop of this type was useful, how they rated this workshop, should be change the format before we held another, what they thought of our PUMP project, and if they would be willing to allow us to visit them in their offices. A compilation of their comments to each question follows.

To determine the make up of our response group, we asked them if they represented an oil producer, service company, consultant or other. Six work for oil production companies, one for a service company, five are consultants or work for a consulting company, and four indicated

"other" on the form.

Four considered themselves or their companies to be technology developers, six considered themselves to be technology users, and five indicated that they developed and used technology. One referred to himself as a technology facilitator, a person who transferred technology developed by others to producers for their use. Four of the producers considered themselves to be technology users, whereas the other two oil producers indicated that they use technology and develop some of their own.

The technology users all believe that technology is important in future oil production, helping to produce more oil at a lower cost, particularly in tighter reservoirs. Three of the technology developers addressed this same question, but all three referred to price as the controlling factor. However, one responded, "in the long run properly applied technology will have a greater impact than price." Those who both use and develop technology felt that technology was important and differed on the importance of price. One stated that "technology is essential regardless of price," but another said "price drives the use and access to new technologies." Another qualified the use of technology, saying that the "effective use of known technology may be more important than new technology."

We asked the group to give us their opinion of organizing this type of workshop in an effort to discover from industry their technical problem, needs and current solutions. The oil producers all said yes, but one said "yes and no - need more participation from industry personnel." Another was equally as emphatic, stating "absolutely in conjunction with PTTC."

The need for more industry participation also was expressed by the non-producers present; one suggested that more service company participation also would help. Another suggested that we try to work more directly with the various independent oil and gas associations, perhaps by asking them to set up a committee to work with the PMP Council. Still another suggested that the case histories presented are important, and that we should bring in other success stories from around the United States.

One person felt that the group was willing to express their problems and needs more so than their solutions, and another observed that many in attendance seemed more focused on gas production than oil production.

The oil producers all gave high marks to this workshop and offered ideas to make future workshops even better. They liked the combination of case studies and problem identification, called the technology presentations stimulating, and that the breakout sessions were well prepared and the highlight of the workshop. However, some felt the breakout sessions were too short, and more time could have been gained for discussion of problems if we had kept the speakers on our time schedule.

This same comment was made from those in the ranks of consultants and others at the workshop: more time for the breakout discussions, fewer talks or shorter talks. However, several commented that the speakers were good as a group, especially those who presented local and national case histories, and were very informative, covering a variety of topics and issues. One

suggested that he would have liked copies of the presentation bound together; another suggested that at the end we should have integrated the findings of all three breakout groups.

This in fact, was what we had originally intended to do. We wanted the entire group to prioritize the findings of each of the three groups as they presented their results, and then have the entire group prioritize the findings into one list. Due to time constraints, this was not done. As people started to leave we moved forward with a discussion of the PMP Council.

Three of the oil producers did not seem to feel that a different type of approach would be necessary for our final workshop next year, although one said more time for discussion would be better. However, the other three offered good ideas, with the common theme being to look back at the identified problems and review the proposed solutions and see if any had been implemented. This would determine what was accomplished and industry could move forward from there.

The non-producers expressed similar opinions. Most believed the format was not a concern, but content is important. They suggested new speakers presenting new technology along with a review of what we had learned in the two-year effort. They specifically suggested obtaining feedback from participants to see how effective we had been in resolving some of the concerns expressed in the breakout sessions. Another suggested a high technology approach, presenting best practices used in other regions, with a discussion of why these practices may be applicable in the Appalachian basin. This in fact, is a major goal of the project.

We did not get a good set of responses to our question concerning how the participants rated our PUMP Program as outlined during the introductory remarks, and if they had any suggestions as to how it could be improved. Six made no attempt to answer the question, and many said it was good, or a good beginning, but others confused the goals and objectives of our two-year program with the goals and objectives of the workshop itself. Even with this confusion, many of those who responded felt we gave them a good idea of what we are trying to accomplish.

Two interesting comments that were made cannot be implemented. One suggestion was that PUMP should pay for local R&D projects. Our contract cannot, but these producers and consultants can apply for research funds under an upcoming solicitation. The second suggestion was that gas producers should be included. This of course is a DOE decision that is beyond our control.

Two of the more important questions were at the end of the form: would you be willing to have us interview you in your office or serve on the PMP Council? And, if so, who should we contact, and how can we make contact?

Of the six oil producers, four answered yes, they would allow us to interview them in their offices, and they would serve on the proposed PMP Council. One of the other two agreed to serve on the Council, and the other agreed to be interviewed. All six provided us with contact information.

Only four of the six representatives from service companies and the consulting sector responded. One agreed to be interviewed and to serve on the council; another also agreed to both, but stated that operators provide the best source of information. A third agreed only to be interviewed, saying that only operators should be on the PMP Council. The fourth agreed only to be interviewed, and made no further comment. All four provided contact information.

The four who indicated "other" as describing themselves or their employer, all declined to be interviewed or to serve on the Council.

SUMMARY

The morning session went well. Virginia Lazenby gave an informative keynote address that was entertaining and well received. The technology presentations were thought provoking and actually transferred useful technology to the producers present. Our only problem was staying on schedule, which forced us to extend the technology presentations beyond lunch, and reduce our breakout sessions from six to three.

The breakout sessions were useful in identifying technology problems and solutions that participants would like to see developed, but as a whole they were not as successful in identifying current best management practices in this basin, or in other areas that could be transferred to this basin. However, if the workshop participants are representative of the oil producing community as a whole, we should be able to schedule enough in-office interviews to develop a more detailed database of preferred practices, and we should be able to recruit enough quality volunteers to create an aggressive, pro-active Preferred Management Practices Council.

In general, we believe that the workshop satisfied the goals that we set for it.

ATTACHMENTS

Workshop Program

Speaker biographies

Registration list

Evaluation forms

Speaker slides

Invitation letter

Problem and Preferred Management Practices Identification Workshop
January 22, 2002; NRCCE, Morgantown, WV

- PROGRAM -

8:00	Registration and Continental Breakfast - Foyer
9:00	Workshop begins - Assembly Rooms A & B
9:00	Introductory Remarks - Douglas G. Patchen
9:15	Keynote Addresses : Appalachian Oil and Technology: the Key to Survival - G. G. Lazenby, Chairman, Bretagne Group, Nashville, TN - Stan Pickens, IPAA Regional Director for West Virginia
10:00	Coffee Break - Foyer
10:15	Case Studies and Solutions from the Field - Lance Cole, PTTC Project Manager, Tulsa, OK
10:30	Brine Disposal in Ohio and Accessing Uphole Reserves Behind Pipe - Kevin Smith, Vice President, Oxford Oil, Zanesville, OH
10:45	Production Monitoring Practices - Tim Knoblock, James Engineering, Marietta, OH
11:00	An Innovative Air Lift System for Oil Wells - Steve Smith, Airlift Services, Anderson, IN
11:15	Real-Time Monitoring System to Improve Production at the Wellsite - Ali Rdissi, Carthage Software, Inc, McKees Rocks, PA
11:30	Membrane Technology to Produce On-Site Nitrogen for Enhanced Oil Recovery - Bernie Miller, Bretagnia
11:45	Pumping Wells in Appalachia: Problems and Remedies - Carl Starr, CNR/Nisourse
12:00	Lunch - Foyer
	PTTC Producer Advisory Group Business Meeting - Room 125
1:00	Reconvene to Organize Breakout Sessions

1:15 Breakout Groups 1-3:

Group 1: Water Management, Fluid Lift and Separation

Group 2: Scale and Paraffin Treatment; Corrosion and Well-bore Remediation

Group 3: Data Collection - Use, Needs, Automation and Management

2:00 Breakout Groups 4-6:

Group 4: Drilling, Completion and Stimulation

Group 5: Reservoir Characterization, Heterogeneity and Compartmentalization; Diagnostics and Imaging Technology

Group 6: Enhanced Oil Recovery Injection Well Permitting, Operations and Environmental Compliance

2:45 Coffee Break

3:00 General Session: Breakout Group Reports and Priorities

4:30 The Concept of a “Best Management Practices” Council

5:00 Adjourn

SPEAKER BIOGRAPHIES

Virginia B. (Gigi) Lazenby is Chairman of the Bretagne Group, an oil and gas producing company that specializes in enhanced oil recovery using a patented nitrogen huff and puff technology in their operations in Kentucky and Tennessee. She has been an active member in numerous oil and gas organizations, like the Kentucky Oil & Gas Association, and has served as President of the National Stripper Well Association, on the Board of Directors of the American Petroleum Institute; as a member of the National Petroleum Council; and on the Board of Directors of the Independent Petroleum Association of America. She received the 2001 Leadership Award from IPAA in recognition for her service to that group.

Stanley Pickens retired in April 2000 as Chairman & CEO of Dominion Appalachian Development, Inc in Jane Lew, WV, although he continued to serve as Vice President of Northeast Gas Basins and then as VP of Special Projects for Dominion Exploration & Production until January 1, 2001. During his long career he was very active in state, regional and national oil and gas organizations, such as the Independent Oil and Gas Associations in West Virginia, Ohio, Virginia and Kentucky. He currently serves on the Board of Directors for IOGA-WV, and has served three previous terms, as well as being a three-time President of that organization. In 1996, he received IOGA-WV's highest honor, their Distinguished Service Award. He also has been recognized at West Virginia's Oil & Gas Man of the Year (1988) and as a Distinguished West Virginian (1994) by then Governor Underwood. He has served two terms on the IPAA Executive Committee, chairing several of their committees, and currently serves IPAA as their Governor for West Virginia, Virginia and the Washington, DC area.

Lance Cole is National Project Manager for the Petroleum Technology Transfer Council in Tulsa, OK, where he is responsible for technical oversight of PTTC's ten Regional Lead Organizations, contract reporting to the national office, and as technical advisor on all aspects of the PTTC program. He holds a B.S. in Chemical Engineering and a M.S. in Management. His professional experience includes reservoir and corrosion engineering, as well as reserve estimation and appraisal. He has worked with a major oil company, a large, fully-integrated independent, and in engineering-oriented consulting companies. He is a licensed Professional Engineer in the state of Oklahoma.

Kevin Smith is Vice President of Oxford Oil Company in Zanesville, OH and past Chairman of PTTC Producer Advisory Board in the Appalachian Region. In that capacity he served three years on the PTTC Board of Directors, and has been actively involved with various PTTC programs since its inception in 1994.

Tim Knobloch is a consulting engineer with James Engineering, Inc, a petroleum engineering firm located in Marietta, OH. He previously worked for Amoco Production Company, Quaker State Corporation and Peake Energy. He is experienced in reservoir analysis, economic appraisals, estimating and auditing oil and gas reserves and production operation evaluations. He graduated from Pennsylvania State University with a Bachelor of Science in

Petroleum Engineering.

Steve Smith is Vice President of Sales/Marketing for Airlift Services International in Anderson, IN. He was assisted in his presentation by Dr. John Marvel, a radiologist and engineer and founder and President of the company, and Aaron Oyler, an engineer and co-inventor with Dr. Marvel of the airlift system.

Ali Rdissi is owner of Carthage Software, Inc in McKees Rocks, PA. He is a registered professional engineer wit 29 years experience in oil and gas operations, 26 of which have been in the Appalachian basin. During this time, he has primarily been a production engineer, with additional experience in drilling and reservoir engineering. He became involved in the computer side of the business in 1980, and has developed numerous computer programs for the oil and gas industry and has developed and taught production-related short courses. He has been programming Psion/Teklogix products for the past 12 years and Microsoft Access for six years.

Bernie Miller is President of Bretagne Corporation, a company that operates 550 oil wells in eastern and western Kentucky. He has been actively involved in several oil and gas organizations in the Appalachian basin and at the national level. He has served on the Board of Directors of the Kentucky Oil & Gas Association and of the Independent Petroleum Association of America. He currently serves as Chairman of PTTC's Producer Advisory Group in the Appalachian Region.

Carl Starr is an engineer with NiSource/CNR in Charleston, WV.

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Preferred Management Practices Workshop
22 January 2002

To help us plan future workshops and to move forward on the Appalachian Basin PUMP Program, we ask that you take some time to answer these questions.

1. Which of the following comes closest to describing you or your employer:
   ___ oil producer
   ___ service company
   ___ consultant
   ___ other

2. Do you consider yourself or your company a technology developer or technology user?

   Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled?

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?

4. How would rate this workshop? How could it be improved and what were the highlights?

5. We are planning another workshop in two years. Should our final workshop take a different approach?

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

7. Would you be willing to cooperate further through confidential in_office interviews? Or by serving on the PMP Council?

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

Preferred Management Practices Workshop

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   - X oil producer
   - ___ service company
   - ___ consultant
   - ___ other

2. Do you consider yourself or your company a technology developer or technology user?

   Technology user

   Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled?

   → is key

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?

   YES & NO – Need more participation from industry personnel

4. How would you rate this workshop? How could it be improved and what were the highlights?

   Good introduction to what we are trying to accomplish.

   Again – more input needed from industry operators

5. We are planning another workshop in two years. Should our final workshop take a different approach?

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council?

maybe

yes

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

by email – Paul Archer – geopetrollc@aol.com

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   - ___ service company
   - ___ consultant
   - ___ other

2. Do you consider yourself or your company a technology developer or technology user?

   Technology user

   Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled?

   Technology has a future as a key role in the basin

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?

   Yes

4. How would you rate this workshop? How could it be improved and what were the highlights?

   Good workshop in seeking areas to concentrate emphasis

   Keep presenters to time constraints

5. We are planning another workshop in two years. Should our final workshop take a different approach?

Yes. It should look back at the program and see the strengths & weaknesses for formation of future projects

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

Good concept. No additional ideas at this time.

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council?

Can serve on PMP Council

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

Contact Bernie Miller
859-335-5776
bmiller@thetagnegp.com.
Lexington Ky

Preferred Management Practices Workshop

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1. Which of the following comes closest to describing you or your employer:
   - X oil producer
   - ___ service company
   - ___ consultant
   - ___ other

2. Do you consider yourself or your company a technology developer or technology user?

   BOTH

   Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled? PRICE DRIVES THE USE & ACCESS TO NEW TECHNOLOGIES

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?

   ABSOLUTELY IN CONJUNCTION WITH PTTC

4. How would you rate this workshop? How could it be improved and what were the highlights?

   NICE COMBINATION OF CASE STUDIES ALONG WITH PROBLEM IDENTIFICATION

5. We are planning another workshop in two years. Should our final workshop take a different approach? NO. MAYBE THE PROBLEMS IDENTIFIED SHOULD BE RE-ADDRESSED

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council? YES

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

KEVIN SMITH

Preferred Management Practices Workshop

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1. Which of the following comes closest to describing you or your employer:
   - ✓ oil producer
   - ___ service company
   - ___ consultant
   - ___ other

2. Do you consider yourself or your company a technology developer or technology user?
   user

Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled?

Technology has a key role

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?

yes

4. How would you rate this workshop? How could it be improved and what were the highlights?

Good. Spend more time in the breakout groups. The breakout groups were the highlights

5. We are planning another workshop in two years. Should our final workshop take a different approach?

second workshop should determine what was accomplished in the first workshop and go from there. Add more case studies and less service co. advertising.

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

good

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council?

Interviews - yes

Council - yes

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

Miller Rep.

Gary Bible

DeLoy Miller

Ernie Rayne

Preferred Management Practices Workshop

22 January 2002

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   - X oil producer
   - ___ service company
   - ___ consultant
   - ___ other

2. Do you consider yourself or your company a technology developer or technology user?
   both

   Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled? technology is essential regardless of price

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?
   yes

4. How would you rate this workshop? How could it be improved and what were the highlights?
   Good beginning by Presentations were all good & stimulating
   good ~~prep~~ for workout sessions
   prep

5. We are planning another workshop in two years. Should our final workshop take a different approach?

Results of looking at identified problems —
+ review solutions proposed —
implemented (hopefully)

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

Good beginning —
would like to see
most imp problems ie training /
with a proposed solution ie (training booklet) —
posted on website —

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council? yes

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

Bernie Miller - President of Bretayne —
859.335.5776
Mid-morning

Preferred Management Practices Workshop

22 January 2002

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1. Which of the following comes closest to describing you or your employer:
   - ✓ oil producer
   - ___ service company
   - ___ consultant
   - ___ other

2. Do you consider yourself or your company a technology developer or technology user?

   tech user

   Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled?

   tech is a critical role

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?

   Yes

4. How would you rate this workshop? How could it be improved and what were the highlights?

   Good workshop

   maybe more time to discuss problems & solutions

5. We are planning another workshop in two years. Should our final workshop take a different approach?

approach was effective.
More time for discussion might be helpful

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

Sounds good. Like the PTC, the ability to evolve as the programs progresses should be important.

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council?

Yes to both. However, I have many more questions than answers, and am more familiar with gas as opposed to oil.

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

Tammy Cate
tcate@anwes.com

Preferred Management Practices Workshop

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1. Which of the following comes closest to describing you or your employer:
   - ___ oil producer
   - X service company
   - ___ consultant
   - ___ other

2. Do you consider yourself or your company a technology developer or technology user?

Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled?

In the long run properly applied technology will have a greater impact than price

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?

Problems and needs more so than solutions

4. How would you rate this workshop? How could it be improved and what were the highlights?

Good at bringing out concerns. Need to know how the concerns will be addressed by PTTC

5. We are planning another workshop in two years. Should our final workshop take a different approach?

Need to review steps made to resolve / address concerns and get feed back from participants the effectiveness in the resolution to the concerns

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council?

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

David Mack
304 - 744 - 4784

Preferred Management Practices Workshop

22 January 2002

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1. Which of the following comes closest to describing you or your employer:
   - ___ oil producer
   - ___ service company
   - ✓ consultant
   - ___ other

2. Do you consider yourself or your company a technology developer or technology user?

   BOTH

   Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled?

   YES!

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?

   PARTIALLY; MORE INDUSTRY AND SERVICE COMPANY WOULD BE OF BENEFIT.

4. How would you rate this workshop? How could it be improved and what were the highlights?

   (1) Good Job

   (2) GET copies of presentations sufficiently beforehand to hand out bound copies.

   (3) · LIMIT SPEAKER'S TIME for presentation

5. We are planning another workshop in two years. Should our final workshop take a different approach?

No, similar approach is fine.

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

Somehow include gas producers if possible
AT LEAST INVITE THEM

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council?

YES to both!

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

Tim Knobloch 740.373.9521
James Engineering, Inc.

EAST RESOURCES formerly DEVON (PENNZOIL)
↳ MIKE MCKOWN @ PARKERSBURG, WV office

Preferred Management Practices Workshop

22 January 2002

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1. Which of the following comes closest to describing you or your employer:
   - ___ oil producer
   - ___ service company
   - X consultant
   - ___ other

2. Do you consider yourself or your company a technology developer or technology user?

   Both

   Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled?

   Technology has a key role.

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?

   Yes. Case histories are important. Bring in other successes around U.S.

4. How would you rate this workshop? How could it be improved and what were the highlights?

   Good due to local case histories combined with other U.S. case histories

5. We are planning another workshop in two years. Should our final workshop take a different approach?

No, but plan one for 2003 with different operators.

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

Good program. PUMP should pay for local R+D projects.

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council?

I would, but operators provide best source of info.

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

Joe Frantz - Holditch-RT

412-787 5403

Preferred Management Practices Workshop

22 January 2002

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1. Which of the following comes closest to describing you or your employer:
   - ___ oil producer
   - ___ service company
   - ✓ consultant
   - ___ other

2. Do you consider yourself or your company a technology developer or technology user?

   Both

   Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled?

   Effective use of known technology may be more important than new technology. Basic competencies need improvement.

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?

   Yes

4. How would you rate this workshop? How could it be improved and what were the highlights?

   More time needed for breakout sessions. Fewer presentations.

5. We are planning another workshop in two years. Should our final workshop take a different approach?

present what was learned in the project.

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

fair

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council?

interviews OK. Operators should be on the PMP Council

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

Larry Pekut

LPEKUT@ADV-RES.COM

703-525-8420 09:30 AM - 5:30PM

Preferred Management Practices Workshop

22 January 2002

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1. Which of the following comes closest to describing you or your employer:
   - ___ oil producer
   - ___ service company
   - ✓ consultant
   - ___ other

2. Do you consider yourself or your company a technology developer or technology user?

YES. HANDHELD COMPUTERS + PC APPLICATION

Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled?

IT IS PRICE CONTROLLED

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?

ABSOLUTELY

4. How would you rate this workshop? How could it be improved and what were the highlights?

VERY GOOD. HIGHER OPERATOR PARTICIPATION IS A MUST FOR THE SUCCESS OF SUCH WORKSHOP.

5. We are planning another workshop in two years. Should our final workshop take a different approach?

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council?

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

Preferred Management Practices Workshop

22 January 2002

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1. Which of the following comes closest to describing you or your employer:
   - ___ oil producer
   - ___ service company
   - ✓ consultant
   - ___ other

2. Do you consider yourself or your company a technology developer or technology user?

   YES

   Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled? YES BUT PRICE IS VERY IMPORTANT

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?

   YES

4. How would you rate this workshop? How could it be improved and what were the highlights?

   GOOD, A LONGER PERIOD.

5. We are planning another workshop in two years. Should our final workshop take a different approach?

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council?

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

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1. Which of the following comes closest to describing you or your employer:
   - ___ oil producer
   - ___ service company
   - ___ consultant
   - ✓ other

2. Do you consider yourself or your company a technology developer or technology user?

   technology user

   Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled?

   technology is the key. larger volume for lower costs.

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?

   yes.

4. How would you rate this workshop? How could it be improved and what were the highlights?

   O.K Good group of speakers. Covered a lot of issues

5. We are planning another workshop in two years. Should our final workshop take a different approach?

No. Stay the course Hopefully new technology will be available in 2 years

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

It was good. It covered many different production issues.

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council?

No.

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

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   - ___ oil producer
   - ___ service company
   - ___ consultant
   - _X_ other

2. Do you consider yourself or your company a technology developer or technology user?

   technology user

   Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled?

   technology has a key role, particularly, in tight reservoirs

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?

   yes. However, many people attending the workshop have focused on gas production rather than oil production

4. How would you rate this workshop? How could it be improved and what were the highlights?

   Very informative. Most speakers gave well-prepared talks on a variety of production topics.

5. We are planning another workshop in two years. Should our final workshop take a different approach?

Perhaps present high technology practices used in other basins in the U.S.; then, discuss why these practices may be applicable in the Appalachian Basins. (or why they do not apply).

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

Good. Talks by industry people are most valuable

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council?

Not at this time

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

Lance

Preferred Management Practices Workshop

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1. Which of the following comes closest to describing you or your employer:
   - ___ oil producer
   - ___ service company
   - ___ consultant
   - A other

2. Do you consider yourself or your company a technology developer or technology user?

   technology facilitator

   Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled?

   increased efficiency thru technology will always be needed

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions?

   excellent interaction
   repeat every couple years

4. How would you rate this workshop? How could it be improved and what were the highlights?

   one-more step : integration of the three groups findings by the overall group

   PMP council Tim Knoblock
   → website
   → contribute information long term
   → rank document successes

5. We are planning another workshop in two years. Should our final workshop take a different approach?

why wait two years
interim workshops w partial solns

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

more effort on how to find solns

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council?

NA

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them?

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1. Which of the following comes closest to describing you or your employer:
   - ___ oil producer
   - ___ service company
   - ___ consultant
   - ~~A~~ other

2. Do you consider yourself or your company a technology developer or technology user?

Do you feel that technology has a key role in the future of oil in the basin, or is it all price controlled?

3. Do you think a workshop of this type is useful in drawing out from industry their technical problems, needs and current solutions? NOT ENOUGH INDUSTRY.

PERHAPS TRY TO DIRECTLY INVOLVE THE #OGA'S?
MAYBE EACH OF THEM COULD DESIGNATE A COMMITTEE
TO WORK WITH THE PUMP COUNCIL?

4. How would you rate this workshop? How could it be improved and what were the highlights?

5. We are planning another workshop in two years. Should our final workshop take a different approach?

6. How would you rate our PUMP Program as outlined this morning, and how might it be improved?

6. Would you be willing to cooperate further through confidential in-office interviews? Or by serving on the PMP Council? If you want Geo. Survey Representation...

Who should we contact for interviews, etc, and where can they be reached? When is the best time to reach them? L. Wickstrom

Slide 1

Petroleum Technology Transfer Council

Solutions From The Field

Problem & Preferred Management Practices Identification Workshop

Lance Cole

January 22, 2002

Slide 2

Learning from Combined Knowledge & Experience

- Did you Know?
- Ever Reinvent the Wheel?

"I'm personally convinced that 99% of the questions that I'll ever have, someone, somewhere has already answered them."

Slide 3

Leverage Among PTTC

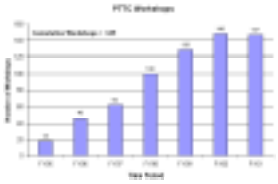
Slide 4

PTTC — A Knowledge Resource

- Regional workshops (and summaries posted on the web)
- Case studies (field proven)
  - >> Petroleum Technology Digest
  - >> Columns/articles
  - >> Newsletter

Slide 5

Regional Workshops



Slide 6

Tech Info

- Case Studies
  - >> Petroleum Tech Digest (35)
  - >> ETEC Conferences (6)
  - >> Regional (102)
- Newsletter Articles (335)
- Workshop Summaries (86)

Slide 7

An Oklahoman's Perception Of Appalachian Oil Constraints

- Lots Of Mature, Low Volume Wells; Potential Doesn't Justify Large Investments
- Reducing Operating Costs
- Finding The "Stars" Among Crowd
- Identifying "Underdeveloped" Potential

Slide 8

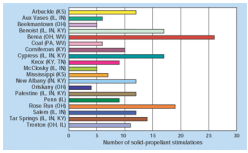
Petroleum Technology Digest

- Solid Propellants Provide Cost-Effective Stimulation (Sep 2001)
- Biological Option for Repairing Polymer-Induced (Fracs) Formation Damage (May 2001)
- Walking-Beam Operated Compressor (March 2001)
- Surface Geochemical Survey Adds Exploration Confidence (May 2000)

Slide 9

Solid Propellant Stimulation

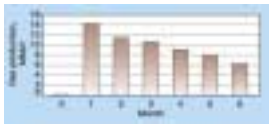
"Gas Gun Treatment Database"



Slide 10

Removing Frac Polymer Damage

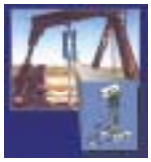
"Biological Option"



Slide 11

Beam-Operated Compressor

"Walking beam-operated"



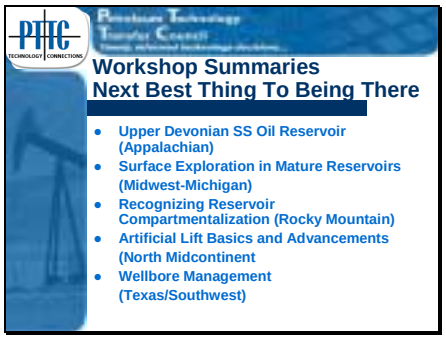
Slide 12

Surface Geochemistry As Developmental Tool

"Surface Geochemistry Survey"

Slide 13

Slide 14



Slide 15

Slide 1

Production Monitoring Practices

Problem and Preferred Management Practices Identification Workshop

January 22, 2002

Tim Knobloch, James Engineering, Inc.

Slide 2

Maximize Production to Maximize Profitability

Profitability is typically maximized from oil and gas wells when maximum production rates are consistently obtained.

Slide 3

The "Problem"

- Many stripper wells have problems which manifest themselves as abnormal production decline
- Production problems often go undetected
- Returning wells to normal production is often slow and costly
- Limited investment capital available due to limited income
- Limited "staff" or time for analysis

Slide 4

Methods of Monitoring Production

- Pumper Monitoring
- Tabular Monitoring
- Percentage Rule
- Computerized Systems

Slide 5

Pumper Monitoring

- Pumper reports production
- Relies on pumper to note changes
- Advantage? – It works and it's easy!
- Fails due to
  - Regular well tender responsibilities
  - Does not establish production goal
  - Insufficient information for long term perspective
  - Gradual changes often not observed

Slide 6

Weekly Pumper's Report

Pumper –

Well Name	Beg	End	Mcfd	Mcfw	Oil	Water	DOL	Oil Shipped	Oil Shipped	Oil Shipped	Tank	Tank	Meter	Comments
		Prod	Prod	Prod	Prod	Bbls	Bbls	Prod	Bbls	Date	Beg	End	Size	
E. Carrick #1	6-6	6-13	7	49	0.84	7	6-8	6-9	1/8					
R. Florence #1	6-6	6-13	10	70	0.84		7					8-5	8-6	1/4
M. Pickerpaugh #3	6-6	6-13	15	105	0		7							1/2
OP Combs #4B	6-6	6-13	10	70	0		7							1/4
Reed #1	6-6	6-13	12	84	0		7							1/4
W. Fitzgerald #1	6-6	6-13	16	112	4.56		7					6-9	7-1	1/4
J. McCall #1	6-6	6-13	20	140	0		7							1/4
R. Krapps #2	6-6	6-13	50	350	0		7							3/4
A. Larrick #1	6-6	6-13	45	315	0		7							3/4
Richey Dunkle #1	6-6	6-13	35	245	0		7							1/2
Richey Lucille #1	6-6	6-13	25	175	26.22		7					5-0	6-11	1/4
JB Bigley #1	6-6	6-13	20	140	0		7							1/4
Dee D. Dunkle #1	6-6	6-13	15	105	0		7							1/4
Richey Reed #1	6-6	6-13	20	140	0		7							1/4
OP Christopher #2SC	6-6	6-13	35	245	0		7							3/4
Owen Reed #1	6-6	6-13	25	175	5.70		7					7-8	8-1	1/4
C. Williams #1	6-6	6-13	20	140	0		7							1/4
Pendee #1	6-6	6-13	45	315	0		7							3/4
M. Pickerpaugh #4	6-6	6-13	35	245	0		7							1/2
John Jenkins #1	6-6	6-13	15	105	6.04		7	94.62				8-4	8-7	1/4
Ellis Miller #3	6-6	6-13	10	70	0		7							1/4
OP Brown #15B	6-6	6-13	5	35	0		7							1/8
L. Stephenson #2	6-6	6-13	15	105	0		7							1/4

Slide 7

Tabular Monitoring

- Compares current month production to previous month's production
- Better than first method
- Fails due to
  - Insufficient information for long term perspective
  - Does not establish production goal
  - Gradual declines can be missed

Slide 8

Tabular Monitoring Example

ABC Production Company
Quarterly Production Summary
July 2001 - September 2001

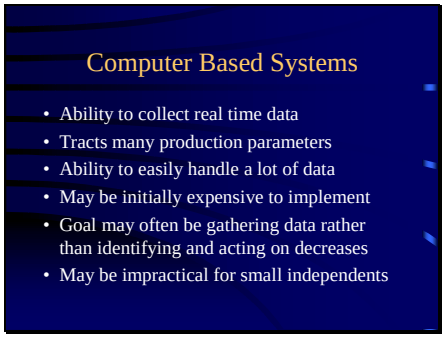
		Actual Barrels of Oil				Actual MCF			
System	Lease	Jul-01	Aug-01	Sep-01	Grand Total	Jul-01	Aug-01	Sep-01	Grand Total
UNDERWOOD	MORE #01, #03,& #05	28	27	27	82	56	54	54	164
UNDERWOOD	MORE B #08	5	4	5	14	5	4	5	14
UNDERWOOD	UNDERWOOD #01 & #02	55	60	59	174	55	60	59	174
	Total Underwood	**88**	**91**	**91**	**270**	**116**	**118**	**118**	**352**
WOLF RUN	WF SMITH #1-5	30	45	40	135	30	45	40	115
WOLF RUN	J SUMMERS 1, 3,4, & 5	0	0	0	0	15	30	15	40
WOLF RUN	G CUMMINGS 1-10	90	90	88	270	45	46	43	135
WOLF RUN	HARLESS 2, 3	25	24	23	72	25	26	23	72
WOLF RUN	GM SUMMERS 1-9	55	50	58	163	110	100	116	326
WOLF RUN	DT CUMMINGS 1-5	10	15	16	41	15	23	24	61.5
WOLF RUN	I DONAHOE 1-6	20	15	25	60	30	23	38	90
WOLF RUN	JH SUMMERS 1-4	25	25	25	75	38	38	38	112.5
WOLF RUN	HIVELY 1-3	10	11	12	33	10	11	12	33
WOLF RUN	JH HIVELY 1, 2	5	5	5	15	5	5	5	15
WOLF RUN	AW SUMMERS 1-10	16	16	17	48	25	26	17	68
	Total Wolf Run	**285**	**301**	**306**	**892**	**359**	**343**	**370**	**1048**
	Grand Total	**373**	**392**	**397**	**1162**	**454**	**459**	**488**	**1400**

Slide 9

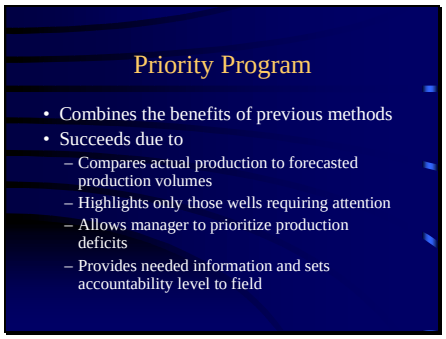
Percentage Rule

- Compares current production to previous month's production volume
- Similar to previous method
- Fails due to
  - No action taken unless downward variance exceeds a set percentage, for example 10%
  - Employs too short a time period
  - Does not establish production goal
  - Well could decline 5% each month

Slide 10



Slide 11



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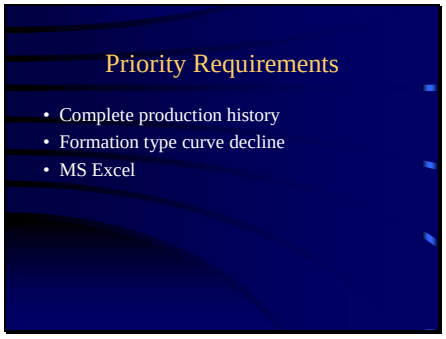

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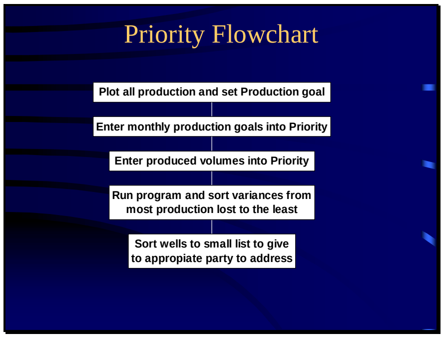


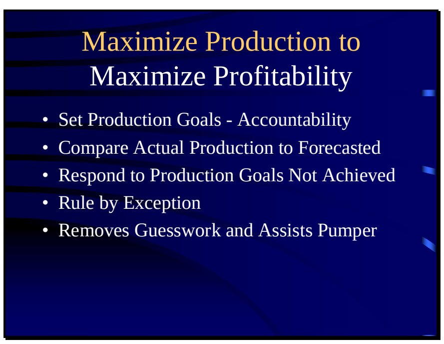
Slide 14

Priority Production Monitoring Report

PRIORITY
Evaluation for Production Month of:

WELL ID	WELL NAME	PUMPER	PIPELINE	PRODUCING METHOD	ACTUAL PROD. (MCFM)	ACTUAL PROD. (BOPM)	FORECASTED PROD. (MCFM)	FORECASTED PROD. (BOPM)	PROD. VARIANCE (MCFM)	PROD. VARIANCE (BOPM)
34-121-2-3265	KRAPPS, R #1	JL	D672	R	0	0	419	0	-419	0
34-121-2-3727	OHIO POWER #1-24	JL	D672	R	0	0	419	0	-419	0
34-059-2-2423	YOHO M. #2	JM	A299	R	192	0	593	1	-401	-1
34-059-2-3613	VALENTINE, D #1	RH	4496	PJE	70	0	426	9	-356	-9
34-121-2-2868	SLATER, G #1	GF	B134	R	29	75	377	0	-348	75
34-119-2-2432	SLACK, W #1	RH	5464	R	636	0	958	4	-322	-4
34-121-2-3161	MOSS #2	GF	D672	R	99	0	405	0	-306	0
34-121-2-3125	ROSSITER, J UNIT #1	GF	B134	R	0	0	293	0	-293	0
34-121-2-1839	SOKOL #1	JL	A287	R	0	0	272	0	-272	0
34-121-2-1444	GUILER #1	JL	9981	R	0	0	256	0	-256	0
34-121-2-3015	KEITH, F #1	GF	B134	R	4	0	259	0	-255	0
34-121-2-3235	SECREST, J #3	MT	C455	R	0	0	251	0	-251	0
34-059-2-3005	BAY #1	RH	4496	PJ	31	0	269	4	-238	-4
34-157-2-2482	FILLMAN-YOUNG UNIT #1	JM	5194	R	358	0	595	0	-237	0
34-121-2-3163	CHANDLER, HR #2	GF	C289	R	0	0	230	0	-230	0
34-059-2-2984	BAY #2	RH	4496	PJ	4	0	227	12	-223	-12
34-167-2-7903	WAGNER, O #1	JL	D672	R	0	0	222	0	-222	0
34-167-2-8276	BAKER-HETRICK UNIT #1	JL	D672	R	7	0	226	0	-219	0
34-059-2-1873	SHEPHERD, IG #1	JM	5590	R	0	0	209	0	-209	0
34-157-2-2675	ROBINSON-BENDER UNIT #3	JM	5194	R	0	0	201	0	-201	0
34-121-2-3153	CHANDLER, HR #1	GF	C289	R	0	0	195	0	-195	0
34-167-2-8091	BAKER, G #1	JL	5073	R	0	0	188	0	-188	0
34-167-2-8091	BAKER, G #1	JL	5073	R	0	0	188	0	-188	0
34-121-2-3251	CARREL, LW #1	JL	D672	R	0	0	188	0	-188	0
34-121-2-3152	PARKS, W #1	GF	C289	R	0	0	188	0	-188	0
34-121-2-3151	ROSSITER-CARREL UNIT #1	GF	C289	R	7	0	188	0	-181	0
34-059-2-1637	GEORGE, J D #1	JM	5073	R	381	0	557	1	-176	-1
34-157-2-2464	POLAND-BOND UNIT #1	JM	5194	R	337	0	513	0	-176	0
34-119-2-5341	WILSON-MCINTIRE UNIT #1	MT	6796	PJE	166	0	342	34	-176	-34
34-157-2-2440	HOUSER, J #1	JM	5590	R	0	0	159	0	-159	0
34-167-2-3150	BAKER, G #8	JL	D672	R	94	0	251	0	-157	0
34-157-2-2851	FOCKLER, L #1	GG	A303	R	30	0	182	3	-152	-3
34-157-2-2618	QUILLEN #2	GG	A303	R	0	29	150	1	-150	28
34-157-2-2613	GASSER #1	GG	A303	R	33	0	182	8	-149	-8

Slide 15



Slide 16

Maximize Production to Maximize Profitability

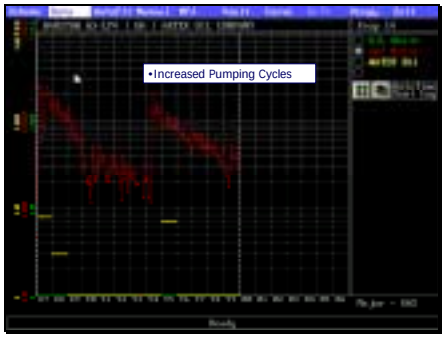
- Minimize Flowing Bottom Hole Pressure to Maximize Production
- Concentrate on the Important
- 20% of Data will Impact 80% of Production
- Test Individual Wells only when Production Varies from Forecast

Slide 17

Slide 18

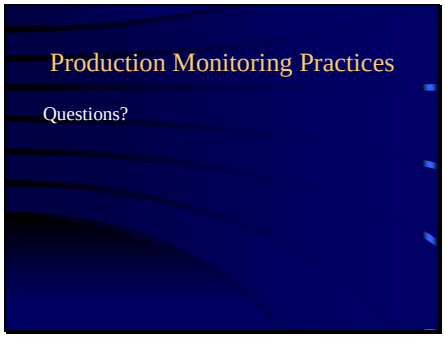
Slide 19

Slide 20



Slide 21

Slide 22



Slide 1

MONITORING SYSTEM TO IMPROVE ACCURACY ND PRODUCTION

Ali Rdissi, P.E.
Carthage Software,, Inc.
1/22/2002, Morgantown

Slide 2

COMMON FIELD OCCURENCES

- ENTERING DATA FOR WRONG WELL OR TANK BATTERY
- MULTIPLE TANK GAGING PROCEDURES
- NOT KNOWING THE PREVIOUS TANK GAUGE AND DATE
- SELECTING WRONG TANK COEFFICIENT FROM CHART
- UNREASONABLE TANK GAUGE ENTRY
- ERRORS IN FLUID PRODUCTION CALCULATIONS
- PRIOR REMEDIAL WORK HISTORY NOT AVAILABLE
- NOT HAVING ACCESS TO PRODUCTION HISTORY
- ERRORS IN TRANSFERRING DATA FROM GAUGE SHEET

A SOLUTION: HANDHELD COMPUTER

Slide 3

Psion Workabout MX Laser Scanner

Slide 4

Features

- 2 MB non-volatile memory
  - Expandable to 18 MB
- Large back lit screen with 13 fonts and 6 styles
- Rugged design
  - 3 1/2-foot drop resistance on concrete
  - Splash and dust resistance
  - Operates between -5 and 131ºF
  - Reads every bar code, 36 scans/sec
  - Runs on 2 AA batteries

Slide 5

APPLICATIONS

* OIL PRODUCTION (PA,NY,OH,WV,KY,MI,CO,VA)
* BRINE HAULING AND DISPOSAL (WV,OH)
* DAILY ACTIVITY LOG (PA,OH,NY)
* GAS PRODUCTION (PA,NY,OH,WV,KY,MI,CO,VA)
* GAS MEASUREMENT (WV,PA)
* GAS STORAGE (NY,PA,WV,OH)
* COMPRESSOR MONITOR (PA,WV,OH,MI,KY,VA)
* DRILLING INFORMATION (PA)
* COMPLETION DATA GATHERING (PA)
* TRUCK MILEAGE (PA,WV)

Slide 6

PROBLEM: Input tank gauges for the wrong tank or battery

REMEDY: Scan the tank or well number via the Workabout MX laser scanner to correctly read the exact number.

Slide 7

PROBLEM: Gaging tanks procedures vary with companies and from well tender to another. Some gauge depth to fluid in tank, some gauge fluid height, some gauge in feet inches, some in inches and some in Bbls.

REMEDY: With the handheld computer system, all well tenders must input data in the same format.

Slide 8

- **PROBLEM**: Not always sure what the last tank gauge was or the reading is not readily available.

- **REMEDY**: With the handheld, the previous record's date and gauge are immediately displayed when the well tender is prompted to input today's gauge.

Slide 9

PROBLEM: If the tank coefficient changes every few inches or feet like it does on some federal leases, a strap chart must be available to convert gauges to actual production.

REMEDY: On the handheld, an automatic lookup table can be inserted or an equation can be programmed calculate the correct production.

Slide 10

- **PROBLEM**: Wrong data type or unreasonable entry.
- **REMEDY**: All tank gauges and oil shipment top and bottom gauges are validated for accuracy. The gauge can be checked against the tank size and display a warning.

Slide 11

PROBLEM: Calculations of fluid produced can contain mathematical errors.

REMEDY: All fluid production calculations are made accurately on the handheld with a display of Production, Target and Variance

Slide 12

- **PROBLEM**: Identifying swab or workover candidates because remedial work history of a well is not documented.
- **REMEDY**: Type a search string to find descriptive comments

Slide 13

PROBLEM: Difficulty viewing well performance history when data is not readily accessible or located in a booklet.

REMEDY: Production history can be accumulated on the handheld for several months. Allows tender to conduct queries and see a production trend graph.

Slide 14

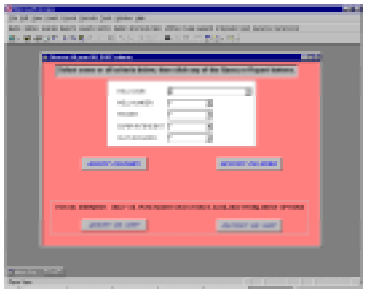
- **PROBLEM**: Manual data transfer from a piece of paper to a PC can result in additional errors by the data entry person.
- **REMEDY**: Electronic data transfer from the handheld to the PC is fast and seamless. The data is intact during the upload. Transfer 1 week of data in 4 seconds.

Slide 15

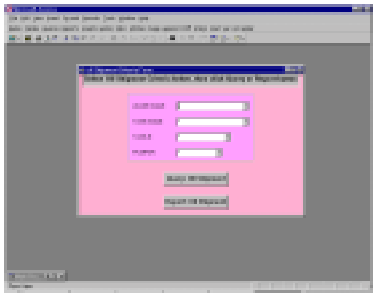
Finally The Bigger Picture

- Integrating the hand held with Microsoft Office products: Access 2000/02

Slide 16



Slide 17



Slide 18

- CONCLUSIONS
- ENTERING ACCURATE GAGES, AND FOLLOWING THEM WITH ERROR FREE CALCULATIONS GOES A LONG WAY IN DIAGNOSING PROBLEMS.
- IN AN ERA WHERE FEW PEOPLE DO MORE, EASILY ACCESSIBLE DATA BECOMES VERY USEFUL DATA.
- A WELL TENDER CARRIES TOOLS WITH HIM ALL THE TIME. THE HANDHELD COMPUTER CAN PLAY A MAJOR ROLE AS ANOTHER TOOL TO HELP HIM DIAGNOSE PROBLEMS AND IMPROVE PRODUCTION.

Slide 1

Membrane Technology to Produce On-Site Nitrogen for Enhanced Oil Recovery

Bernie Miller
Bretagne

Slide 2

Nitrogen Membrane Unit

- This Membrane Unit gives the ability to generate Nitrogen gas on site.
- This technology allows Nitrogen to be generated on site at a cost much less than other gases.

Slide 3

Basis of Process

Relative Permeation Rates

H_2O H_2 H_2S NH_3 CO_2 H_2S CH_3OH CO Ar N_2 CH_4 C_2H_6 C_3H_8

Fast Slow

- The membrane unit is based on the relative permeation rates of the various gases.
- Note that there is only a small difference between methane and nitrogen thus difficult to separate.

Slide 4

Chemical

Inerting
Drying
Tank and tanker blanketing
Reaction Injection Molding
Pressure Transfer
Purging
Pipeline pigging
Packaging
Sparging

Oil & Gas

Oil and Gas - Drilling operations
Offshore platform utility
Catalyst regeneration
Enhanced oil recovery
Pipeline Purging
Tank and tanker blanketing

Food / Beverage

Controlled Atmosphere Storage
Packaging
Wine/Fruit Juice/Beer Dispensing
Deinfestation
Purging
Pressure Transfer

Electronics

Dry Box Storage
Burn-in ovens
Reflow ovens

Pharmaceuticals

Sparging
Packaging
Blanketing

Metals

Aluminum extrusion
Annealing
Carburing

Marine/Offshore

Powder storage
Tanker blanketing
Instrument air (offshore platforms)
Pressure transfer

Slide 5

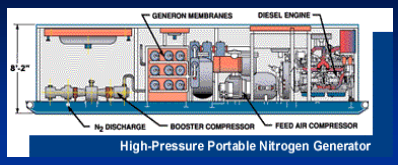
COMPRESSION
1 - Air Filter
2 - Air compressor
3 - Air radiator

FILTRATION
4 - Condensate separator
5 - Coalescing Filters
6 - Carbon tower
7 - Dust Filter
7-bis Liquid Detector
8 - Drain valves

SEPARATION
9 - Heater
10 - Membrane module

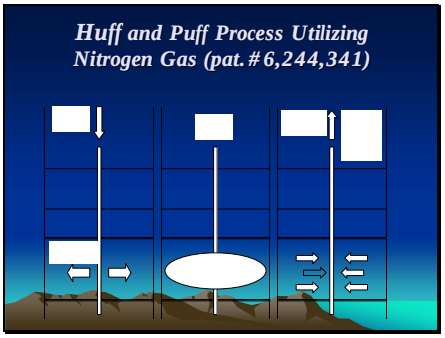
PRODUCTION
11 - Flow valve
12 - Production valve
13 - One way valve
14 - Oxygen Analyzer
15 - Uniform temperature zone.

Slide 6



High-Pressure Portable Nitrogen Generator

Slide 7



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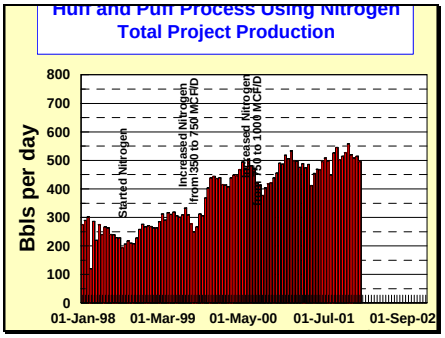

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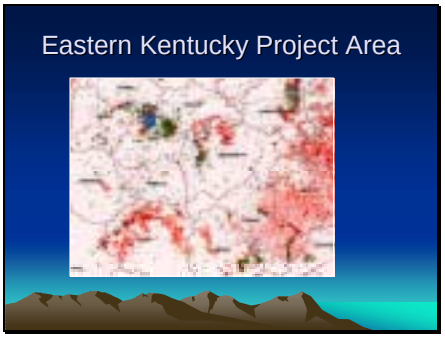

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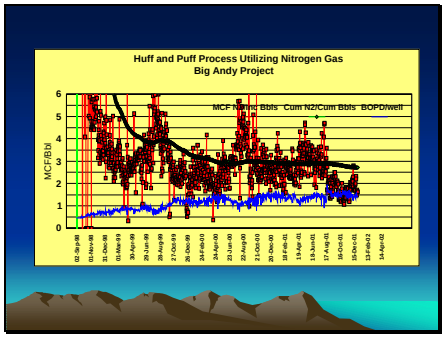

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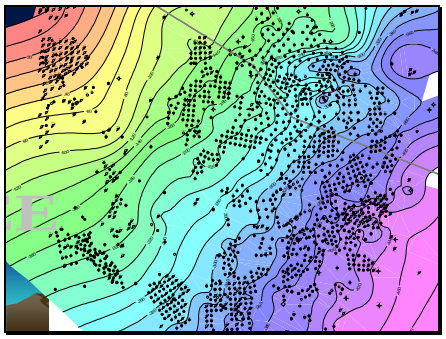

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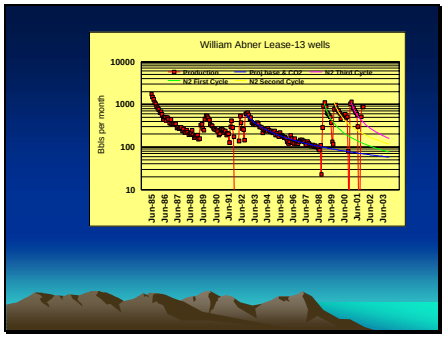

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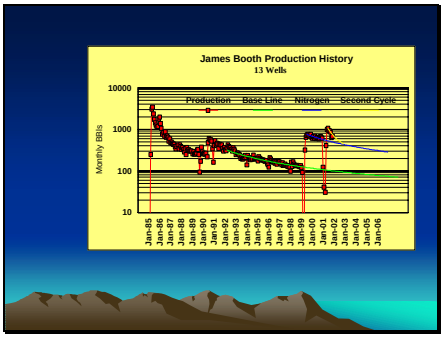

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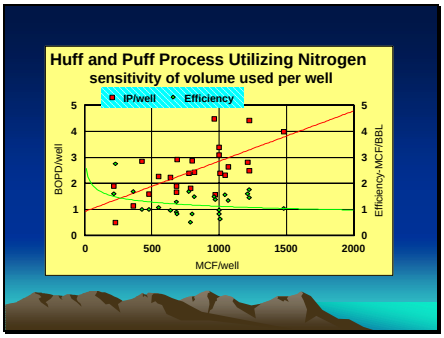
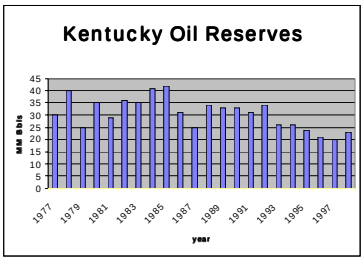


Slide 1

Summary of Oil Production and Reserves for the Appalachian Basin States

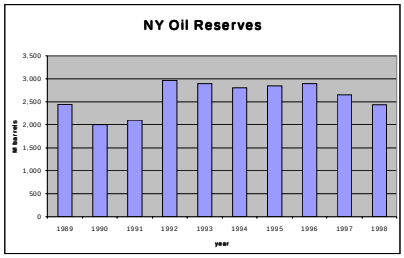
Compiled by Katharine Lee Avary
West Virginia Geological Survey, PO
Box 879, Morgantown, WV 26507-0879
304/594-2331 avary@geosrv.wvnet.edu

Slide 2



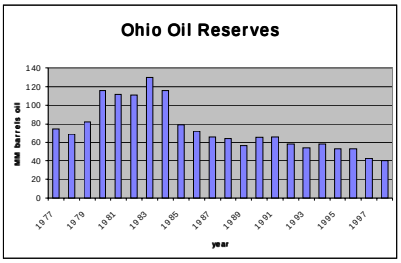
Energy Information Administration

Slide 3



NYS DEC-Division of Mineral Resources

Slide 4



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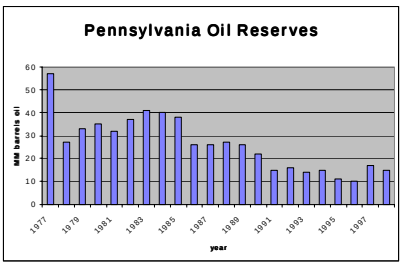

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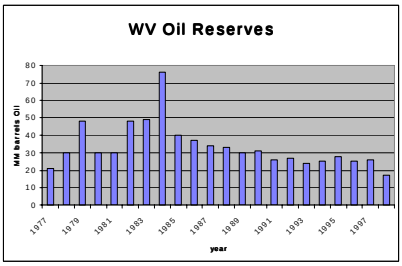

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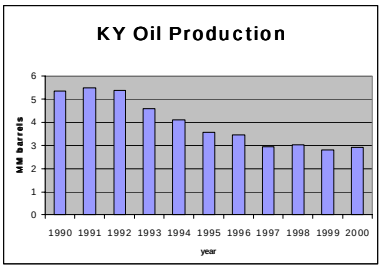
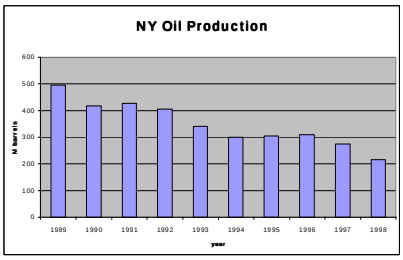


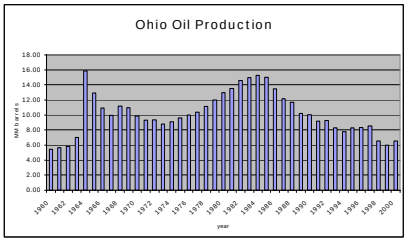
Kentucky Geological Survey

Slide 8



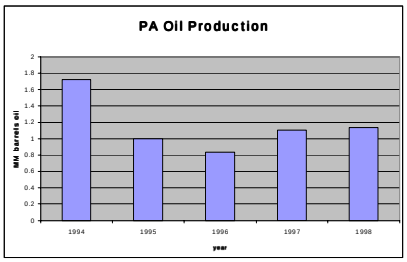
NYS DEC-Division of Mineral Resources

Slide 9



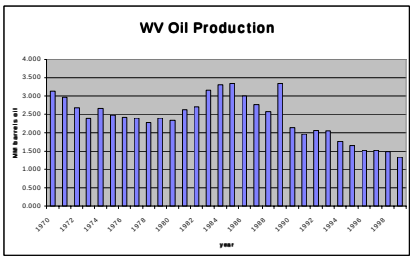
Ohio Geological Survey

Slide 10



Pennsylvania Geological Survey

Slide 11



WV Geological & Economic Survey

Slide 12

Oil Reserves by State- 1998

• Kentucky-	• 23 MM
• New York-	• 2.4 M
• Ohio-	• 40 MM
• Pennsylvania-	• 15 MM
• West Virginia-	• 17 MM
• TOTAL	• 95 MM

From EIA, except for NY from DEC

Slide 13

Oil Production by State-1998

• Kentucky-	• 3.00 MM
• New York-	• 217 M
• Ohio-	• 6.54 MM
• Pennsylvania-	• 1.36 MM
• West Virginia-	• 1.48 MM
• Total	• 12.06 MM

From State geological surveys and NY DEC

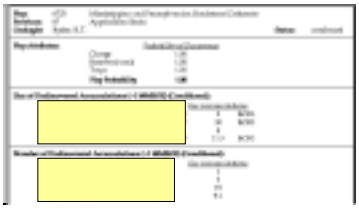
Slide 14

Mississippian & Pennsylvanian Sandstone & Carbonate play

From: USGS DDS-30, 1995 Assessment of US Oil & Gas Resources

Slide 15

Mississippian & Pennsylvanian Sandstones & Carbonate play



From: USGS DDS-30, 1995 Assessment of US Oil & Gas Resources

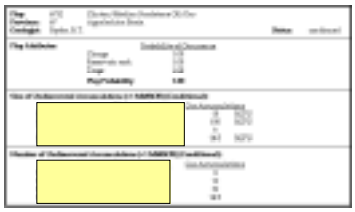
Slide 16

Clinton/Medina Sandstone Oil/Gas Play

From: USGS DDS-30, 1995 Assessment of US Oil & Gas Resources

Slide 17

Clinton-Medina Sandstone Oil/Gas Play



From: USGS DDS-30, 1995 Assessment of US Oil & Gas Resources

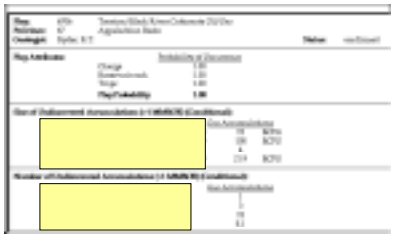
Slide 18

Trenton/Black River Carbonate Oil/Gas Play

From: USGS DDS-30, 1995 Assessment of US Oil & Gas Resources

Slide 19

Trenton/Black River Carbonate Oil/Gas Play



From: USGS DDS-30, 1995 Assessment of US Oil & Gas Resources

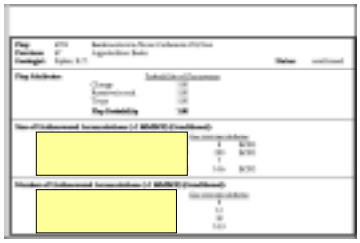
Slide 20

Beekmantown/Knox Carbonate Oil/Gas Play

From: USGS DDS-30, 1995 Assessment of US Oil & Gas Resources

Slide 21

Beekmantown/Knox Carbonate Oil/Gas Play



From: USGS DDS-30, 1995 Assessment of US Oil & Gas Resources

Slide 22

Summary of USGS Assessment

	Size(MMBO) (median)	Number (median)
• Miss/Penn Sandstone/Carbonate	• 1.9	5.1
• Clinton/Medina Sandstone	• 1.8	3.6
• Trenton/Black River Carbonate	• 5.3	5.1
• Beekmantown/Knox Carbonate	• 3.4	17.1

Slide 23

References

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Slide 24

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- *.pdf version*
- http://www.eia.doe.gov/pub/oil_gas/natural_gas/data_publications/crude_oil_natural_gas_reserves/current/pdf/appd.pdf
- *Excel version*
- http://tonto.eia.doe.gov/FTPROOT/natgas/naturalgasdbs.htm

December 21, 2001

Mr. Kevin Smith
Oxford Oil Company
P.O. Box 910
Zanesville, OH 43701

Dear Kevin:

The Appalachian Oil and Natural Gas Research Consortium would like to extend an invitation to you to participate in a special program for the benefit of Appalachian basin oil producers. Specifically, we are inviting you to be our guest at a "Problem & PMP Identification Workshop" on January 22, 2002 at the National Research Center for Coal and Energy on the Evansdale Campus of West Virginia University.

"PMP" refers to **Preferred Management Practices**, which could be improved technologies, better, more available data, or streamlined regulations and permitting, all of which could lead to improved oil field economics, increased production from stripper oil wells, longer well production lives, and delayed abandonments of domestic oil fields.

The identification and documentation of PMPs is an integral part of a new contract between the Department of Energy and the Appalachian Oil and Natural Gas Research Consortium (AONGRC). Under that contract, AONGRC will identify technical problems faced by oil producers in the basin, determine the best practices currently in use in the basin to solve these problems, and identify the best practices used in other basins that could be applied here. Results will be placed on an interactive website which will allow producers to match preferred management practices with problems experienced in drilling, completing and producing oil wells in the region. The website also will contain documented successes, i.e., case histories of new technology applied in a domestic oil field.

The format of the January 22nd workshop will be as follows. We will have a special keynote speaker to set the tone for the rest of the day by providing us with an overview of the current state of the oil industry in the Appalachian basin, and where we will be in the near future. This will be followed by a series of presentations on successful case studies, where research has led to new technology that has reduced cost, or increased production, or both, in an oil field. All case studies chosen for presentation will have real application potential in this basin.

Following the morning presentations, we will put you to work, thereby giving you the opportunity to have direct input into this program. We will divide the group into breakout sessions to discuss specific technical problems and suggested solutions. After we reconvene into one group, we will hear from all breakout groups and then prioritize the various problems and solutions. We also will describe the **Appalachian Basin Preferred Management Council**, a

group of oil producers who will have the responsibility of reviewing and ranking the PMPs identified throughout the project that have been the most effective, and those that have the most potential. The Council also will have input into the design and content of the project's interactive website.

This workshop is by **invitation only.** You have been selected because, in our view, you are a person who not only represents a major oil player in the region, but also has a technical background and an appreciation for innovative technology as well. Please accept this invitation to become part of this new program. There is no registration fee. Lunch, coffee breaks and workshop materials are on us.

To accept our offer, please call Mark Hoffman at 304-293-2867, ext 5446, or e-mail Mark at mhoffma2@wvu.edu **by January 15** at the latest, so that we can adequately plan for lunch and the coffee breaks. If you would like to suggest a topic for one of the breakout groups, be sure to mention that to Mark as well. And, if you have a solution you would like to share, you can volunteer to be one of our morning speakers.

Thank you for your time and interest. We hope to see you on January 22.

Sincerely,

Douglas G. Patchen
Director, AONGRC