

Dr. Stephen J. Naruk
Structural Geology Research Team Leader and Principal Technical Expert - Retired
Shell International Exploration and Production, Inc
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Education

- PhD, 1987, The University of Arizona, Structural Geology and Tectonics
- MS, 1983, The University of Arizona, Structural Geology and Tectonics
- BS, 1977, Yale University, Geology & Geophysics

Professional Experience

2001 – 2018: Principal Structural Geologist – Shell International Exploration & Production, Inc.

- Provide expert technical reviews and advice for exploration and production world-wide.
- Standardize and update structural geology standards, best practices, software and workflows.
- Oversee structural geology classroom and on-line training world-wide.
- Manage global network of 150-200 structural geologists.

2013 – 2018: Structural Geology Research Team Leader – Shell International Exploration & Production Research, Inc.

- Successfully designed, managed and delivered Shell's structural geology research and training programs.
- Developed fundamentally new and proprietary structural interpretation techniques.
- Responsible for numerous internal and external reports, trade secrets, publications and presentations.
- Managed 5-10 staff.
- Responsible for multiple multi-hundred-million dollar business impacts annually in The Americas, Malaysia, Brunei, Nigeria, and Europe.

2005-2013: Team Leader for Clastics Geology Research Team, Reservoir Modeling & Carbonate Geology Team, Reservoir Compartmentalization Team - Shell International Exploration & Production Research and Development Companies

- Successfully led multi-disciplinary teams of technical experts in structural geology, turbidite stratigraphy, carbonate stratigraphy and reservoir engineering.
- Managed up to 19 staff and external relations with multiple universities and consortia in US and Europe located in both Shell Research Lab and Shell Exploration and Production.
- Developed proprietary industry-leading reservoir modeling algorithms and software.

2003 – 2005: Senior Staff Structural Geologist, Reservoir Compartmentalization and NAS Exploration Research Teams – Shell International Exploration and Production, Inc.

- Provided expert technical input to reservoir compartmentalization and Non-Amplitude-Supported exploration and development teams.
- Successfully predicted reservoir compartmentalization and lack thereof at deepwater developments Erha and Bonga, overcoming objections of partners, and impacting final appraisal well counts and plans.

2000 – 2003: Staff Geologist, Structure Traps & Seals Team – Shell Oil Co.

- Personally conducted fault interpretation and seal prediction research.
- Generated \$100 million in E&P savings and 45,000 BOPD increase in production.

1996-1999: Senior Exploration Geologist, Unconventional Exploration Team – Shell Western Exploration and Production, Inc.

- Responsible for generating and evaluating prospects in Cook Inlet Alaska, the Unconventional Austin Chalk fracture play, and the San Juan Basin Coal Bed methane play.

1995: Senior Exploration Geologist, Shell Pecten Latin America Exploration Division

- Generated and reviewed prospects in Colombia, Bolivia and Argentina.
- Led numerous multi-disciplinary farm-out evaluations.
- Responsible for drilling first exploration well in Colorado Basin, offshore Argentina.
- Responsible for early exit from Bolivia, yielding multi-hundred-million dollar savings.

1991 – 1995: Senior Exploration Geologist, Shell Western Exploration and Production Inc. Continental Division, New Play Development.

- Evaluated plays and prospects through-out the Lower 48 states, leading to Shell’s 1992 re-entry into the Permian Basin.

1989 – 1991: Research Geologist, Shell Development Co., Structure & Tectonics Group.

- Developed and taught fundamentally new fault seal and fold and thrust belt interpretation techniques.

1987-1989: Exploration Geologist, Shell Western Exploration and Production, Inc., Alaska Exploration Division.

- Identified and matured prospects for the 1988 Chukchi Sea OCS sale, including the first Chukchi Sea exploration discovery well.

1978-1981: Research Mineralogist, AMAX Minerals and Mining Company, Golden, Colorado.

- Characterized mineralogy and petrography of porphyry and Mississippi Valley type ore deposits using XRD and reflected and transmitted light microscopy.

Awards and Honors

- Shell President’s Award for contributions to Alaska Exploration, 1990.
- AAPG Imperial Barrel Award invited judge for final international competition, 2018.
- Invited AAPG Hedberg Conference Speaker, 2000 and 2002

Advisory Board and Committees

- Advisory Board, University of Arizona Geosciences Department, 2004-2015
 - Chairman, 2006-2009
- Chairman, AAPG Reservoir Deformation Research Committee, 2007-2009

Fellowships and Grants

- SOHIO Petroleum Company, Research Fellowship, 1986.
- Geological Society of America, Research Grant, 1986.
- Sigma Xi, The Scientific Research Society, Research Grant, 1986.
- SOHIO Petroleum Company, Research Grant, 1985.
- The University of Arizona Graduate College, Research Grant, 1984.
- University of Tromso, Norway, Research Grant, 1984.
- Arizona Bureau of Geology and Mineral Technology, Research Fellowship, 1982.
- Yale University, Samuel Lewis Penfield Prize, 1977.

Professional Affiliations

- Texas Licensed Professional Geoscientist # 5925
- American Association of Petroleum Geologists
- The Geological Society of America
- American Geophysical Union
- The Houston Geological Society

Invited Speaker

- 2018, IEAGHG (International Energy Agency Greenhouse Gas Division), Effective Stress Constraints on Vertical Flow in Fault Zones: Learnings from Natural CO₂ Reservoirs.

- 2015, University of Houston, Principles of Hydrocarbon Trap Analysis.
- 2006 Geological Society of London, The Impact of Subtle Faults on Reservoir Performance.
- 2007 University of Michigan, Geologic Analyses of Sealing and Leaking Faults: Implications for Oil & Gas Exploration and Production and CO₂ Sequestration.
- 1995 Oklahoma Geological Society, Structure and Tectonics of the Arbuckle Mountains.
- 1992 University of Houston, Structural geology of the Santa Catalina S-C mylonite zone: Implications for continental extension.
- 1991 University of Southern California, Finite strain analyses of S-C mylonites.
- 1988 University of Southwestern Louisiana, Extensional tectonics of southeastern Arizona.
- 1987 Rutgers University, University of Oregon, Kinematic Significance of Mylonitic Foliations.
- 1984 The University of Arizona, Detachment-fault gold mineralization.
- 1980 Quantitative microscopic analysis. Denver Regional Exploration Geologists.

Journal Referee

- Journal of Marine and Petroleum Geology, 2017, 2018
- Journal of Structural Geology, 2013, 2018
- American Association of Petroleum Geologists Bulletin, 2007, 2009, 2010, 2011, 2015, 2017
- National Science Foundation, 1991
- Geological Society of America Bulletin, 1991
- Geology, 1990
- Engineering and Mining Journal, 1982

Refereed Publications

- He, D., and Naruk, S.J., In Review, Numerical optimization of fold-thrust belt structural interpretations, AAPG Bulletin.
- Wilkins, S.J., Naruk, S.J., and Davies, R., 2018 (In Press), Subsurface observations of deformation bands and their impact on hydrocarbon production within the Holstein Field, Gulf of Mexico, USA, Geological Society of London, Special Publication on Fault Seal Analysis.
- Naruk, S.J., Brandenburg, J.P., Solum, J.G., Wolf, D.E., and Origo, P., 2018 (In Press), Effective stress constrains on vertical fault flow: Learnings from Natural CO₂ Reservoirs, AAPG Bulletin, v. 102.
- Alpak, O., Barton, M.D., and Naruk, S.J., 2013, The impact of fine-scale turbidite architecture on deep-water reservoir performance, AAPG Bulletin v.97, no.2, pp. 251-284
- Solum, J.G., Brandenburg J.P. and Naruk, S.J., 2012, Characterization of deformation bands associated with normal and reverse stress states in the Navajo Sandstone, Utah: Reply, AAPG Bulletin v.96, no.6, pp. 877-890
- Brandenburg, J.P., Alpak, F.O., Solum, J.G., Naruk, S.J., 2012, A kinematic Trishear model to predict deformation bands in a fault-propagation fold; East Kaibab Monocline, Utah, AAPG Bulletin v.96, no.1, pp. 109-132
- Solum, J.G., Brandenburg, J.P., Naruk, S.J., Kostenko, V.V., Wilkins, S.J. and Schultz, R.A., 2010, Characterization of deformation bands associated with normal and reverse stress states in the Navajo Sandstone, Utah, AAPG Bulletin v.94, no.9, pp. 1463-1475.
- Kostenko, O.V., Naruk, S.J., Hack, W., Poupon, M., Meyer, H-J, Mora-Glukstad, M; Anowai, C, and Mordi, M., 2008, Structural evaluation of column-height controls at a toe-thrust discovery, deep-water Niger Delta, AAPG Bulletin, V. 92, no 12, pp. 1615-1638.
- Wilkins, S J. Naruk, S J., 2007, Quantitative analysis of slip-induced dilation with application to fault seal., AAPG Bulletin v.91, no.1, pp.97-113.
- Onyeagoro, U O. Naruk, S J., and Ikomi, J. G., Production-induced cross-fault flow case study: Implications for a swamp field development in the Niger Delta, 2004., Nigeria Int Conf. SPE-88907.

- Onyeagoro, U.O., Busch, J.P., Naruk, S.J., Ozumba, B.M., 2002, Fault seal characterization in Tertiary basins exploration and production life cycle, 26th Annual SPE Nigeria International Conference, SPE-79151.
- Naruk, S.J., Dula, W.F., Busch, J.P., Couzens-Schultz, B.A, Garmezzy, L., Griffiths, H., Gunst, A.M., Hedlund, C.A., McAllister, E., Onyeagoro, U.O., Ozumba, B.M, and Younes, A., 2002, Common characteristics of proven sealing and leaking faults. In, Kaldi, J., Boulton, P., Badley, M., and Almon, B., eds., 2002 AAPG Hedberg Research Conference, Evaluating the Hydrocarbon Sealing Potential of Faults and Caprocks, Barossa Valley, South Australia, December 1-5, 2002, pp. 71-74.
- Naruk, S.J., 2000, Fault-seal Prediction in the Gulf of Mexico: Empirical Data, in Shoup, R., Watkins, J., Karlo, J., and Hall, D., eds., 2000, Integration of Geologic Models for Understanding Risk in the Gulf of Mexico, AAPG Hedberg Conference Proceedings.
- Naruk, S.J., 1994, Geometric analyses and balanced cross sections of the Arbuckle Mountains and Washita Valley Fault, *Shale Shaker*, v. 45, pp. 10-15.
- Naruk, S.J., and Bykerk-Kauffman, A., 1990, Late Cretaceous and Tertiary deformation of the Santa Catalina Metamorphic Core Complex, Arizona. In, Gehrels, G.E., and Spencer, J.E., *Geologic Excursions through the Sonoran Desert Region, Arizona and Sonora*, Arizona Geological Survey Special Paper 7, pp.41-50.
- Ruf, A.S., Naruk, S.J., Butler, R.F., and Calderone, G.J., 1988, Strain and magnetic fabrics in the Santa Catalina and Pinaleno Mountains metamorphic core complex mylonite zones, *Arizona: Tectonics*, v.7, p.235-248.
- Houser, B.B., Thorman, C.H., Naruk, S.J., 1988, Geologic map of the Thatcher SE quadrangle, Graham County, Arizona, U.S. Geological Survey Geologic Quadrangle Map GQ-XXXX scale 1:24,000.
- Houser, B.B., Thorman, C.H., Naruk, S.J., 1988, Geologic map of the Thatcher SW quadrangle, Graham County, Arizona, U.S. Geological Survey Geologic Quadrangle Map GQ-XXXX scale 1:24,000.
- Naruk, S.J., 1987, Displacement calculations across a metamorphic core complex mylonite zone: Pinaleno Mountains, southeastern Arizona: *Geology*, v. 15, p.656-660.
- Naruk, S.J., Bykerk-Kauffman, A., Davis, G.H., Currier-Lewis, D., Lewis, S.W., and Faulds, J.E., 1987, Reply to comment by Verbeek on "Kink folding in an extended terrane: Tortilla Mountains, southeastern Arizona:" *Geology*, v. 15, p.87 1.
- Naruk, S.J., Bykerk-Kauffman, A, Davis, G.H., Currier-Lewis, D., Lewis, S.W., and Faulds, J.E., 1987, Reply to comment by Wust on "Kink folding in an extended terrane: Tortilla Mountains, southeastern Arizona:" *Geology*, v.15, p.872.
- Davis, G.H., Naruk, S.J., and Thorman, C.H., 1987, Structural geology of the Rincon and Pinaleno metamorphic core complexes, southeast Arizona. In, Davis, G.H., and VandenDolder, E.M., (eds.), *Geologic diversity of Arizona and its margins: Excursions to choice areas*. Geological Society of America, p.249-259.
- Thorman, C.H., and Naruk, S.J., 1987, Generalized bedrock geologic map and distribution of mylonitic rocks in the eastern Pinaleno Mountains, Graham Co., Arizona. USGS Open File Report
- Naruk, S.J., 1986, Strain and displacement across the Pinaleno Mountains shear zone, Arizona, USA: *Journal of Structural Geology*, v.8, p.35-46.
- Naruk, S.J., Bykerk-Kauffman, A., Cumer-Lewis, D., Davis, G.H., Faulds, J.E., and Lewis, S.W., 1986, Kink folding in an extended terrane: Tortilla Mountains, southeastern Arizona: *Geology*, v.14, p.1012-1015.
- Kligfield, R., Crespi, J., Naruk, S., and Davis, G.H., 1985, Reply to comment on "Displacement and strain patterns of extensional orogens:" *Tectonics*, v.4., p.591-593.
- Kligfield, R., Crespi, J., Naruk, S., and Davis, G.H., 1984, Displacement and strain patterns of extensional orogens: *Tectonics*, v.3, p.577-609.
- Odekirk, J.R., Naruk, S., and Taylor, P., 1981, Computer processing of microscopic point-count data - an example. In, Hausen, D.M., and Park, W.C., (eds.), *Process Mineralogy: Extractive Metallurgy Mineral Exploration, Energy Resources*, p.253-265.

Naruk, S., 1981, Quantitative microscopic analysis of sulfide flotation circuits – an example. In, Hausen, D.M., and Park, W.C., (eds.), Process Mineralogy: Extractive Metallurgy, Mineral Exploration, Energy Resources, p.429-434.

AAPG Search and Discover Articles

- Molinaro, M., Hauge, T., O'Connor, S., Salem, A., Kostenko, O.V., and Naruk, S., 2017, Onshore San Joaquin Basin and Temblor Range, California: New Insights into the Structural Framework and Exploration Potential of a Complex and Mature Fold and Thrust Belt, AAPG Search and Discovery Article #10958, 18p.
- Solum, J.G., Jolley, S., Lawson, R., and Naruk, S., 2013, Increasing Interpreter Capability in Structurally Complex Settings, AAPG Search and Discovery Article 120150, 3p.
- Kostenko, O.V., and Naruk, S.J., 2009, 3-D Geometry and Kinematic Evolution of Deep-Water Toe Thrust Anticlines, AAPG Search and Discovery Article #110101, 28p.
- Onyeagoro, U.O., Van der Vlugt, F.F., and Naruk, S.J., 2006, The Impact of Fault Properties on Reservoir Production Behaviour, AAPG Search and Discovery Article #9006, 1p

Abstracts

- Naruk, S., Solum, J., and Van Berkel, J., 2018, Loss of Containment and Leakage up Fault Zones, AAPG 2018 Annual Convention and Exhibition, Salt Lake City, Utah.
- Naruk, S., Brandenburg, J.P., Solum, J., Origo, P., and Wolf, D., 2018, Effective Stress Constraints on Vertical Fault Seal Capacity: Implications for subsurface CO₂ sequestration and conventional HC production, EAGHG Modelling and Risk Management Network Meeting 18th-22nd June 2018, Grand Forks, North Dakota.
- Salem, A., Solum, J., Naruk, S., Minisini, D., Desjardins, P., and Hnat, J., 2018, Integration of Core Fracture and Lithofacies Descriptions in the Wolfcamp Shale: Implications for Mechanical Stratigraphy and Production, Unconventional Resources Technology Conference Book p.27.
- Getsinger, A. and Naruk, S., 2017, Investigating the Effect of Deformation on Hydrocarbon Retention in Shale Plays: AAPG 2017 Annual Convention and Exhibition, Houston, Texas.
- Molinaro, M., Hauge, T., O'Connor, S., Salem, A., Kostenko, O., V., and Naruk, S., 2017, Onshore San Joaquin Basin and Temblor Range, California: New Insights into the Structural Framework and Exploration Potential of a Complex and Mature Fold and Thrust Belt, AAPG 2017 Annual Convention and Exhibition, Houston, Texas.
- Naruk, S., Brandenburg, J.P., He, D., Kirschner, D., Solum, J., and Wolf, D., 2014, Scale-dependent Strategies for Modeling the Impact of Seismically Unimaged Deformation Features, Invited Keynote Speaker, Geological Society London conference on Small to Subseismic Scale Deformation.
- Naruk, S., 2013, Forward Modeling of Un-imaged Foldbelt Traps, AAPG 2013 Annual Convention and Exhibition, Pittsburg, PA.
- Solum, J.G., Jolley, S.J., Lawson, R., and Naruk, S., 2013, Increasing Interpreter Capability in Structurally Complex Settings, AAPG Hedberg Conference, 3D-Structural Geologic Interpretation: Earth, Mind and Machine, Reno, Nevada.
- Naruk, S.J., Brandenburg, J.P., Solum, J.G. and Wolf, D.E., 2012, Effective Stress Controls on Fault Vertical Conductivity: Learnings for both Carbon Storage and Conventional Hydrocarbon Reservoirs, AAPG 2012 Annual Convention and Exhibition, Long Beach, CA.
- Orlando, O., Lonnee, J., Tcherepanov, E., Prudhomme, M., Sur, S, Costello, M, Jennings, J., Mahood, R. and Naruk, S.J., 2012, AAPG 2012 Annual Convention and Exhibition, Long Beach, CA.
- Brandenburg, J.P., Cardozo, N., Naruk, S., and Wolf, D., 2012, Direct Strain Estimates from Palinspastic Restoration of Compressional Structures: Strengths and Limitations, AAPG 2012 Annual Convention and Exhibition, Long Beach, CA.

- Summers, J., Naruk, S., Thackerey, S., Solum, J.G., and Wolf, D.E., 2012, Integrated Trap Analysis in High Pressure High Temperature Fields; Central North Sea, AAPG 2012 Annual Convention and Exhibition, Long Beach, CA.
- Alpak, F.O., Noirot, J-C., Barton, M.D. and Naruk, S.J., 2011, Impact of fine-scale turbidite architecture on deepwater reservoir performance, AAPG 2011 Annual Convention and Exhibition, Houston, Tx.
- Noirot, J.C., Alpak, F.O., Barton, M.D., Sylvester, Z., Naruk, S.J., 2011, A generic workflow for incorporating the impact of fine scale turbidite architecture into coarse dynamic models, AAPG 2011 Annual Convention and Exhibition, Houston, Tx.
- Brandenburg, J.P., Alpak, F.O., Naruk, S. and Solum, J., 2011, Optimized Trishear Modeling and Incomplete Seismic Data: Filling the White Space, AAPG 2011 Annual Convention and Exhibition, Houston, Tx.
- Kostenko, O.V., and Naruk, S., 2009, 3-D Geometry and Kinematic Evolution of Deep-Water Toe Thrust Anticlines, AAPG Annual Meeting and Convention, Denver, Co.
- Solum, J.G., Naruk, S., Thompson, J., and Snee, R., 2009, Improving Understanding of Compartmentalization Through Linking Mechanical Stratigraphy to Statistical Predictions of Sub-seismic Faults, AAPG Annual Meeting and Convention, Denver, Co.
- Kostenko, O.V., Naruk, S., Solum, J.G., Mora-Glukstad, M., Brandenburg, J., 2009, Sealing Properties of Thrust Faults, AAPG Annual Meeting and Convention, Denver, Co.
- Onyeagoro, K., Naruk, S., Eikmans, D., van der Vlugt, F., Jolley, S.J., Zijlstra, E., DeKeijzer, M., Kristensen, M., Reemst, P., King, R., 2009, New Fault Permeability and Capillary Entry Pressure Relations for Production History Matching of Matured Fields, AAPG Annual Meeting and Convention, Denver, Co.
- Brandenburg, J., Solum, J.G., Kostenko, O.V., Naruk, S., and Schultz, R.A., 2009, Deformation Band Networks in Mesozoic Eolian Sandstones of the Western United States and Offshore Hydrocarbon Reservoirs, AAPG Annual Meeting and Convention, Denver, Co.
- Onyeagoro, U.O., Van der Vlugt, F.F., and Naruk, S.J., 2006, The Impact of Fault Properties on Reservoir Production Behaviour, AAPG International Conference, Perth, Australia
- Naruk, S.J., 2000, Fault Seal Evaluation and Prediction, AAPG Annual Meeting and Convention, New Orleans, La.
- Naruk, S., 1994, Balanced Cross Sections of the Arbuckle-Ardmore Region, Southern Oklahoma: Implications for Interpreting Strike-Slip Deformation, Houston Geological Society Bulletin, Volume 36, No. 5, January 1994.
- Apotria, T.G., and Naruk, S.J., 1993, Stress History and Fracturing of the Bakken Shale in the Williston Basin, AAPG Annual Meeting and Convention, New Orleans, La.
- Naruk, S.J., 1984, A model for detachment fault gold mineralization, Geological Society of America Abstracts with Programs, v. 18, no. 2.

Select Internal Shell E&P Reports

- Getsinger, A., and Naruk, S., 2015, How deformation affects retention in unconventional plays, SR.15.10163_13.
- Naruk, S., Brandenburg, J.P., Solum, S., Wolf, D; and Origo, P. 2011, Effective stress constraints on vertical fault flow, SR.11.13053_06.
- Naruk, S., 2010, An example of successful pre-drill fault seal predictions, EP2010-7001_05.
- Gordon, M.B. and Naruk, S.J., 2010, Bogda Shan In-situ Stress Study, EP 2010-3058
- Naruk, S. and Brandenburg, J.P. 2009, Field Trip Guide to the Arbuckle Mountains, Southeastern Oklahoma, USA - EPW Turbodudes Field Trip.
- Naruk, S., 2009, Structural geologic analysis of Bonga 690 central channel reservoir: Impact of small-throw faults, EP 2009-7022_03.
- Naruk, S.J., 2009, Successful Pre-drill Fault Seal Predictions in the East Boomvang Field, Deepwater Gulf of Mexico, EP 2009-3114.

- Noirot, J.C., Kostenko, O., Alpak, O., Naruk, S., and Onyeagoro, K., 2009, Reservoir simulation of the impact of faults in sheet and lobe turbidite environments, EP 2009-7001
- Naruk, S.J., Alpak, O.; Onyeagoro, K; van der Vlugt, F; Kostenko, O.V., and Noirot, J.C., 2008, Recovery factors for faulted channelized turbidite toe-thrust reservoirs - Results of synthetic simulation models, EP 2008-7005_14.
- Naruk, S.J., Dula, W.F., Busch, J.P., Couzens, B.A., Garmezy, L., McAllister, E., Onyeagoro, U.O., Wilkins, S.J., Younes, A., Griffiths, H., Hedlund, C.A., Kifli, R., Ozumba, B.M., and Tabor, J.R., 2005, Fault Seal for Exploration, EP 2005-7021_04.
- Naruk, S.J., Dula, W.F., Wilkins, S.J., Hedlund, C.A., Couzens-Schultz, Busch, J.P., and Garmezy, L., 2005, Structural Interpretation Guidelines for Deep Water Thrust-belt Traps, EP 2005-3064
- Naruk, S.J., Onyeagoro, U.O., Anowai, C., and Gonsalves, C.J., 2005, Fault and Top Seal Analyses of the Deep Ursa Hermes Prospect, Gulf of Mexico , EP 2005-3136.
- Briggs, S., Naruk, S.J., and Glass, F., 2005, Ursa BCD Fault Seal Calibration Study and Application to Mummy and B-South Prospects, Deepwater Gulf of Mexico, EP 2005-3161.
- Onyeagoro, U.O., van der Vlugt, F., Naruk, S.J., Eikmans, S., Jolley, S.J., de Keijzer, M., Wiersema, W., Zisjlstra, E.B., King, R.D., Tixier, C.E., and Reemst, P.H.M., 2005, FaultSealFunctions v 2005.1, EP 2005-3148.
- Tabor, J.R., Naruk, S.J., and Busch, J.P., 2003, Characterization of the Structural Development of the Bolia Trap: Implications From Gross and Interval Isopach Maps And Palinspastic Restorations.
- Onyeagoro, U.O, Naruk, S.J., and Busch, J.P. 2002, A technique to estimate cross-fault flow and fault transmissibility in simulation and development planning settings, EP 2002-3068.
- Onyeagoro, K., Naruk, S.J., Dula, W.F., and Garmezy, L.L., 2001, Sensitivity Analysis and Prediction of Dynamic Fault Behavior: Sensitivities of Cross-Fault Flow to Variations in Fault Rock Properties, EP 2001-3119.
- Naruk, S.J., 1998, Correlation of known fault seals with shale gouge ratio, Gulf of Mexico shelf, SIEP 98-7004.