

James Evan. Sivil

Professional Summary

November 6, 2025

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Professional Preparation

Academic Background

B.S. Radio-Television-Film, The University of Texas at Austin, December 2009

Professional Appointments

Present Position: Research Scientist Associate I, Bureau of Economic Geology, The University of Texas at Austin (March 19 2014 - Present).

Research Technician (Temporary), Bureau of Economic Geology, The University of Texas at Austin (August 2011 - March 2014).

Producer Assistant, Second Unit Director, Vic-DiGital Production (July 2010 - September 2011).

Producer, D&E Production (January 2010 - August 2011).

Media Coordinator, Instructor, Galena Park I.S.D., Galena Park, Texas (August 2010 - May 2011).

Continuing Education Courses Taken

Sedimentary Rocks (Geo 416m): The University of Texas at Austin, Austin, Texas, August 29-December 16, 2019

Programming Fundamentals I (Cosc 1336): Austin Community College, Austin, Texas, September 23-December 15, 2019

Calculus II (Math 2414): Austin Community College, Austin, Texas, May 28-August 12, 2019

Earth Materials (Geo 416k): The University of Texas at Austin, Austin, Texas, August 25-December 17, 2018

Calculus I (Math 2413): Austin Community College, Austin, Texas, August 27-December 16, 2018

Precalculus (Math 2412): Austin Community College, Austin, Texas, May 29-August 13, 2018

Trigonometry (Math 1316): Austin Community College, Austin, Texas, January 16-May 13, 2018

Chemistry II (Chem 1112): Austin Community College, Austin, Texas, August 28-December 17, 2017

Areas of Expertise

Areas of Expertise

High-resolution X-ray fluorescence: methodology and calibration

Operating and maintaining an isotope-ratio mass spectrometry laboratory

SPECTRA EDX and S1CalProcess X-ray fluorescence calibration software

Presentations

Invited Presentations

The Woodford Formation and distal Mississippi Lime within the Midland Basin: presented to West Texas Geological Society, presented at West Texas Geological Society Fall Symposium, Midland, Tex., September 19-21, 2023.

CorePy: Visualizing, integrating, and upscaling core-based geochemistry through neural network-derived chemofacies models: presented to iRIS-2020 Rock Imaging Summit, November 16, 2020.

Facies, Depositional Environments, Chemostratigraphy, and Reservoir Quality of the Middle Devonian Marcellus Formation, Appalachian Basin, Northeastern Pennsylvania: presented to Houston Geological Society, presented at Houston Geological Society Northsiders' Luncheon, Houston, Tex., September 17, 2019.

Presentations

Is Classopollis a zombie taxon in the Lower Wilcox Group?: presented to AAPG IMAGE, Houston, Tx, August 2024.

Palynostratigraphy of the Lower Wilcox Group, onshore Texas: presented at AAPG IMAGE, Houston, Tex., August 29-31, 2023.

Facies and Associated Reservoir Characteristics of Second Bone Spring Carbonate, Third Bone Spring Siliciclastics (Sand), and Wolfcamp A and B in southern Delaware Basin: presented to AAPG SEG, presented at IMAGE, Houston, TX, August 29, 2023.

Revisiting Mississippian Barnett Shale: Lithological and Geochemical Control on Varied Reservoir Heterogeneity and Fluid Saturation from Late Oil to Dry Gas Window, Fort Worth Basin, Texas: presented to AAPG, presented at AAPG SWS, Wichita Falls, Texas, May 9, 2023.

Comparing Lithofacies & Chemofacies of 3rd Bone Spring Siliciclastics, Wolfcamp A & B, northern vs. southern Delaware Basin, TX: presented to MSRL Annual Meeting, presented at MSRL Annual Meeting, Austin, TX, April 13, 2023.

Revisiting Barnett Shale: Barnett in Condensate Window & Verification of Measured Porosity and Permeability in the Mississippian Barnett Shale, Wise and Denton Co., Texas: presented to MSRL Annual Meeting, presented at MSRL Annual Meeting, Austin, Texas, April 13, 2023.

Lithologic response to OAE2 across the drowned Comanche Platform, South Texas: presented to GCSSEPM Foundation, presented at 38th Annual Perkins-Rosen Research Conference, Houston, Tex., December 5-9, 2022.

High resolution facies stacking and reservoir attributes across the Wolfcamp and Third Bone Spring intervals, Delaware Basin: A machine learning approach to integrate core and wireline measurements: presented to West Texas Geological Society, Odessa, Tex., September 21, 2022.

Targeting the Leonardian Basinal Bone Spring Carbonates in the Southern Delaware Basin: Example from Upper 2nd Lime, Pecos Co., TX: presented to Unconventional Resources Technology Conference (URTeC), presented at 2022 Unconventional Resources Technology Conference (URTeC), Houston, Texas, June 20-22, 2022.

Facies and Associated Reservoir Quality of the 3rd Bone Spring Siliciclastics & Wolfcamp A and B, Pecos Co., southern Delaware Basin, west Texas: presented to MSRL consortium members, presented at MSRL Annual Meeting, Houston, Tex., April 11-12, 2022.

Facies and Associated Reservoir Quality of the Basinal Leonardian 2nd and 3rd Bone Spring Carbonates, Delaware Basin, west Texas: presented to MSRL consortium members, presented at MSRL Annual Meeting, Houston, Tex., April 11-12, 2022.

Informing drill cuttings analysis with core-based measurements - a cost effective approach to expand reservoir characterizations where core is unavailable: presented to MSRL consortium members, presented at MSRL Annual Meeting, Houston, Tex., April 11-12, 2022.

Informing drill cuttings analysis with core-based measurements - a cost effective approach to expand reservoir characterizations where core is unavailable: presented to 2022 MSRL Annual Meeting, Houston, Tex., April 11-12, 2022.

Characteristics of the Leonardian Third Bone Spring Lime, Reeves County, southern Delaware Basin, Texas: presented to MSRL members, presented at 2021 MSRL Core Workshop, Houston Core Research Center, December 7, 2021.

Integrating lithofacies and chemofacies characterizations for the Permian Basin Wolfcamp XY and Third Bone Spring Formation, Delaware Basin, Texas: presented to American Association of Petroleum Geologists (AAPG-ACE), Denver, Colorado, October 2021.

Integrating lithofacies with geochemical and petrophysical properties of the Tithonian-Valanginian Vaca Muerta Fm., central Neuquén Basin, Argentina: presented to AAPG, presented at International Meeting for Applied Geoscience & Energy (IMAGE), Online oral presentation, September 27-29, 2021.

Estimating Lithologic Facies in Argillaceous and Carbonate-Rich Mudrocks Using X-Ray Fluorescence Measurements and Multivariate Statistics: presented to American Association of Petroleum Geologists (AAPG-ACE), San Antonio, Tex., May 2019.

Poster: Core characterization workflow: developing internally consistent geochemical databases: presented to Austin Community College, presented at Annual Meeting of Mudrock Systems Research Laboratory (MSRL) Industrial Associates, Austin, Tex., April 2018.

Developing the mudrock calibration for handheld X-ray fluorescence for core-scanning applications: presented to Bureau of Economic Geology, presented at Annual Meeting of Mudrock Systems Research Laboratory (MSRL), Austin, Tex., March 19-22, 2018.

Poster: Preliminary chemostratigraphic record from the Devonian Three Forks Formation and associated units, North Dakota: presented to Austin Community College, presented at Reservoir Characterization Research Laboratory (RCRL) Annual Industrial Associates Meeting, Austin, Tex., September 2016.

Poster: Microbeam X-ray fluorescence scanning of slabbed MIS-5 corals from West Caicos: developing a workflow for improving sample selection for U-Th disequilibrium dating: presented to The University of Texas at Austin, presented at Reservoir Characterization Research Laboratory (RCRL) Annual Industrial Associates Meeting, Austin, Tex., August 2016.

Poster: Technical methods for conducting horizontal core XRF-based chemostratigraphy: an example from the Eagle Ford Formation, Atascosa County, South Texas: presented to The University of Texas at Austin, presented at Annual Meeting of Mudrock Systems Research Laboratory (MSRL), Austin, Tex., March 21-24, 2016.

Activities of a Professional Nature

Major Field Campaigns

Application of rebound hammer (Proceq Bambino) for Yanchang Petroleum Project in Xi'an, China, 2015, 3-18 January: Tasked with performing high-resolution rock-hardness test on two cores from the Yanchang Formation of the Ordos Basin, China.

Extensive geochemical analysis of four drilled cores for Yanchang Petroleum in Xi'an, China, 2013, 13 November-12 December: Traveled with four X-ray fluorescence instruments, three vacuum pumps, several laptops, and a variety of lab consumables to perform high-resolution analysis on ~1000 ft of drilled core. A benchtop X-ray diffraction instrument was provided on location by Olympus, and powders were taken for stable isotope analysis. During our time scanning, we trained over a dozen employees of Yanchang Petroleum on the methods and

importance of XRF analysis.

Traveled to North Dakota Geological Survey to perform high-resolution XRF analysis on 11 cores totaling over 1000 ft, 2014, 4-21 December: Managed a team of two temporary employees and one student alongside Dr. Harry Rowe to perform extensive analysis on the Bakken Formation. Drilled powders and performed further XRD/TOC/isotope analyses

Activities of a Professional Nature

Supervisor of laboratory technicians Gabrielle Getts, Scott Schulz, Luis Rangel, and Blake Bezucha (2019)

Trainer and provider of data interpretation assistance for students Junwen Peng and Charlie Zheng (2019)

Supervisor of laboratory technicians Sara Gregory, Nolen Brown, and Molly McCreary (2018)

Supervisor of laboratory technicians Charles Tuppen, Gregg Stephens, and Alanna Self (2017)

Supervisor of laboratory technicians John Grillo, Nathan Kallidin, Miranda Bernard, and Jarred Garza (2016)

Supervisor of laboratory technicians Jake Roberson and Amber Mullins (2015)

Supervisor of laboratory technicians Krystal Heibel, Zain Abdi, and Robert Nikirk (2014)

Trainer and provider of data interpretation assistance for students Kelly Hattori, Peter Schemper, and Esben Pedersen (2018-Present)

Trainer and provider of data interpretation assistance for students Nick Ettinger, Hualing Zhang, Wendi Liu, Lei Jiang, and Miaomiao Meng (2017-Present)

Trainer and provider of data interpretation assistance for Ahmed Alnahwi, Peter Soto-Kerans, and Ningjie Hu (2016-Present)

Trainer and provider of data interpretation assistance for students Kyle Gabb, Michael Nieto, Lauren Redmond, Chris Hendrix, and Lucy Ko (2015-Present)

Funding

Research Support

Research Science Associate II: Mudrock Systems Research Laboratory (MSRL)/Reservoir Characterization Research Laboratory (RCRL)/State of Texas Advanced Resources Recovery (STARR), Bruker AXS (formerly Bruker Analytical X-Ray Systems) (April 2018; Two TRACER 5i (T5i) handheld X-ray fluorescence instruments worth \$100,000).

Publications

Peer Reviewed Journal Articles

Ko, L. T., Loucks, R. G., Rowe, H., Reed, R. M., Sivil, J. E., and Adriaens, R., 2025, Mudstone diagenesis in the Cenomanian-Turonian Eagle Ford Group in the San Marcos Arch area. Part I: chemostratigraphy, early diagenesis, bitumen expulsion and migration pathways: Marine and Petroleum Geology, v. 172, no. 107162, 41 p., <http://doi.org/10.1016/j.marpetgeo.2024.107162>.

Ko, L. T., Loucks, R. G., Rowe, H., Adriaens, R., Sivil, J. E., and Mertens, G., 2024, Mudstone diagenesis with depth and thermal maturity in the Cenomanian-Turonian Eagle Ford group. PART II: diagenetic processes and paragenetic sequence: Marine and Petroleum Geology, v. 170, no. 107085, 39 p., <http://doi.org/10.1016/j.marpetgeo.2024.107085>.

Smith, V., Hessler, A., Moscardelli, L., Bord, D., Olariu, I., Lorente, M. A., Sivil, E., and Liu, X., 2024, A late refugium for Classopollis in the Paleocene Lower Wilcox Group along the Texas Gulf Coast: Geology, v. 52, no. 4, p. 251-255, <http://doi.org/10.1130/G51772.1>.

Larson, T. E., Loucks, R. G., Sivil, J. E., Hattori, K. E., and Zahm, C. K., 2023, Machine learning

classification of Austin Chalk chemofacies from high-resolution x-ray fluorescence core characterization: AAPG Bulletin, v. 107, no. 6, p. 907-927, <http://doi.org/10.1306/09232220095>.

Larson, T. E., Sivil, J. E., Periwal, P., and Melick, J., 2023, A machine-learning workflow to integrate high-resolution core-based facies into basin-scale stratigraphic models for the Wolfcamp and Third Bone Spring Sand, Delaware Basin: Interpretation, v. 11, no. 4, p. SC91-SC104, <http://doi.org/10.1190/INT-2023-0009.1>.

Loucks, R. G., Larson, T. E., Zheng, C. Y. C., Zahm, C. K., Ko, L. T., Sivil, J. E., Peng, S., Ruppel, S. C., and Ambrose, W. A., 2020, Geologic characterization of the type cored section for the Upper Cretaceous Austin Chalk Group in southern Texas: a combination fractured and unconventional reservoir: AAPG Bulletin, v. 104, no. 10, p. 2209-2245, <http://doi.org/10.1306/04222019197>.

Reed, R. M., Sivil, J. E., Sun, X., and Ruppel, S. C., 2019, Heterogeneity of microscale lithology and pore systems in an Upper Cretaceous Eagle Ford Group horizontal core, South Texas, U.S.A.: GCAGS Journal, v. 8, p. 22-34.

Rowe, H. D., Wang, X., Fa, B., Zhang, T., Ruppel, S. C., Milliken, K., Loucks, R. G., Shen, Y., Zhang, J., Liang, Q., and Sivil, J. E., 2017, Chemostratigraphic insights into fluvio-lacustrine deposition, Yanchang Formation, Upper Triassic, Ordos Basin, China: Interpretation, v. 5, no. 2, p. SF149-FS165, <http://doi.org/10.1190/INT-2016-0121.1>.

Peer Reviewed Book Chapters

Knapp, J., Larson, T. E., and Sivil, J. E., 2022, Subsurface characterization for energy applications, in Drake, B. L., and MacDonald, B. L., eds., Advances in portable X-ray fluorescence spectrometry--instrumentation, application and interpretation: Croydon, UK, Royal Society of Chemistry, p. 251-297, <http://doi.org/10.1039/9781839162695>.

Conference Proceedings

Hessler, A., Sivil, J. E., Liu, X., Smith, V., Lorente, M. A., and Moscardelli, L., 2023, Geochemical fingerprinting of facies and environments across 106-year delta cycle in the Paleocene Lower Wilcox Group, IMAGE.

Moscardelli, L., Smith, V., Hessler, A., Olariu, M. I., Lorente, M. A., Sivil, J. E., and Liu, X., 2023, Revisiting the onshore Lower Wilcox Group: implications for the development of subsurface low carbon energy solutions in the Gulf Coast Region, IMAGE.

Smith, V., Olariu, M. I., Bord, D., Moscardelli, L., Sivil, J. E., Hessler, A., and Liu, X., 2023, Palynostratigraphy of the Lower Wilcox Group, onshore Texas, IMAGE, Houston.

Ko, L., Larson, T., Martinez, D., Roger, S., Periwal, P., and Sivil, J. E., 2022, Targeting the Leonardian Bone Spring limestone in the Southern Delaware Basin: Example from upper 2nd limestone, Pecos County, West Texas, Unconventional Resources Technology Conference (URTeC), Unconventional Resources Technology Conference, 20-22 June 2022, Houston, Texas, 1215-1222 p.

Contract Reports

Gale, J. F. W., Baumgardner, R., Bhandari, A., Darvari, R., Dommissse, R., Eichhubl, P., Elliott, S. J., Fall, A., Flemings, P., Hamlin, H. S., Landry, C. J., Mohanty, K., Nicot, J.-P., Polito, P., Prodanovic, M., Ramiro-Ramirez, S., Reed, R. M., Rowe, H., Ruppel, S. C., and Sivil, J. E., 2019, Multi-faceted study of water cut in the Permian Wolfcamp in the Delaware Basin, West Texas: final report prepared for Shell, under contract no. UT OSP# 201503146-001, 292 p.

Ambrose, W. A., Smith, D. C., Cutright, B. L., Scanlon, B. R., Reedy, R. C., Elliott, B. A., Paine, J. G., Foss, M. M., Tremblay, T. A., Wolaver, B. D., Loucks, R. G., Frébourg, G., Hentz, T. F., Ogiesoba, O. C., Olariu, M. I., Fu, Q., Zeng, H., E. L. Frost, III, Hamlin, H. S., Nance, H. S., Duncan, I. J., Hammes, U., Rogers, H., Clift, S. J., Sivil, J. E., Zhang, T., Reed, R. M., Baumgardner, R. W., Jr., Eastwood, R., Breton, C., Rowe, H. D., Carr, D. L., Dunlap, D. B.,

Gale, J. F. W., and Peng, S., 2014, State of Texas Advanced Resource Recovery (STARR) progress report: Bureau of Economic Geology, Biennium prepared for Texas State Comptroller of Public Accounts, 90 p.

Published Reports

Moscardelli, L., Ambrose, W. A., Young, M. H., Scanlon, B. R., Flaig, P. P., Olariu, M. I., Hattori, K., Ko, L., Loucks, R. G., Radjef, E., Maraggi, L., Schuba, N., Sivil, J. E., Peng, S., Zhang, T., Sun, X., Zeng, H., Ogiesoba, O. C., Fu, Q., Reed, R. M., Rogers, H., Duncan, I. J., Dommissie, R., Jensen, J., Hessler, A., DeJarnett, B. B., and Periwal, P., 2023, State of Texas Advanced Resource Recovery (STARR) 2020-2022 biennium report: The University of Texas at Austin, Bureau of Economic Geology 51 p.

Ambrose, W. A., Rogers, H., Smith, D. C., Scanlon, B. R., Paine, J. G., Nicot, J.-P., Young, M. H., Loucks, R. G., Hentz, T. F., Reed, R. M., Ogiesoba, O. C., Olariu, M. I., Fu, Q., Flaig, P. P., Zhang, J., Hattori, K., Roberts, A., Zeng, H., DeJarnett, B. B., Radjef, E., Periwal, P., Peng, S., Duncan, I. J., Ren, B., Jensen, J., Male, F., Dommissie, R., Eastwood, R., Carr, D. L., Zhang, T., Ko, L., Larson, T., Lawton, T., Covault, J., Sylvester, Z., Goodman, E., Calle, A., Smye, K. G., Pelletier, I., Dunlap, D. B., Lambert, J., and Sivil, J. E., 2021, State of Texas Advanced Resource Recovery (STARR) 2018-2020 biennium report: The University of Texas at Austin, Bureau of Economic Geology 44 p.

Ambrose, W. A., Smith, D. C., Hentz, T. F., Loucks, R. G., Reed, R. M., Ogiesoba, O. C., Olariu, M. I., Fu, Q., Zeng, H., Hamlin, H. S., Duncan, I. J., Carr, D. L., Ko, L., Peng, S., Jensen, J., Rogers, H., Clift, S. J., Sivil, J. E., Zhang, T., Eastwood, R., and Brooks, D. L., 2019, State of Texas Advanced Resource Recovery (STARR) progress report: The University of Texas at Austin, Bureau of Economic Geology 43 p.

Ambrose, W. A., Smith, D. C., Hentz, T. F., Loucks, R. G., Reed, R. M., Ogiesoba, O. C., Olariu, M. I., Fu, Q., Zeng, H., Hamlin, H. S., Duncan, I. J., Carr, D. L., Ko, L., Peng, S., Rogers, H., Clift, S. J., Sivil, J. E., Zhang, T., Eastwood, R., and Brooks, D. L., 2018, State of Texas Advanced Resource Recovery (STARR) interim report: Bureau of Economic Geology, The University of Texas at Austin, 26 p.

Ambrose, W. A., Smith, D. C., Young, M. H., Scanlon, B. R., Reedy, R. C., Collins, E. W., Elliott, B. A., Wolaver, B. D., Paine, J. G., Hentz, T. F., Frébourg, G., Loucks, R. G., Reed, R. M., Ogiesoba, O. C., Olariu, M. I., Fu, Q., Zeng, H., Duncan, I. J., Rogers, H., Clift, S. J., Foss, M. M., Sivil, J. E., Zhang, T., Baumgardner, R. W., Jr., Eastwood, R., Breton, C., Brooks, D. L., Rowe, H. D., Carr, D. L., Dunlap, D. B., Gale, J. F. W., He, Y., Ko, L., Phelps, R., and Peng, S., 2016, State of Texas Advanced Resource Recovery (STARR) progress report: Bureau of Economic Geology, Biennium prepared for Texas State Comptroller of Public Accounts: 82 p.

Ambrose, W. A., Smith, D. C., Cutright, B. L., Scanlon, B. R., Reedy, R. C., Elliott, B. A., Paine, J. G., Foss, M. M., Tremblay, T. A., Wolaver, B. D., Loucks, R. G., Frébourg, G., Hentz, T. F., Ogiesoba, O. C., Olariu, M. I., Fu, Q., Zeng, H., Frost, E. L., III, Hamlin, H. S., Nance, H. S., Duncan, I. J., Hammes, U., Rogers, H., III, Clift, S. J., Sivil, J. E., Zhang, X., Reed, R. M., Baumgardner, R. W., Jr., Eastwood, R., Breton, C., Brooks, D. L., Rowe, H. D., Carr, D. L., Dunlap, D. B., Gale, J. F. W., and Peng, S., 2014, State of Texas Advanced Resource Recovery progress report and CD-ROM: Bureau of Economic Geology, The University of Texas at Austin, 90 p.

Published Abstracts

Loucks, R. G., Sivil, J. E., and Hattori, K., 2024, Carbon isotope secular curve for the Upper Cretaceous Chalks in the South Texas Maverick Basin showing the expression of the OAE-2 and OAE-3 and associated lithofacies and chemostratigraphy (abs.): ISGC/SEPM Flagstaff, Az.

Ko, L., Larson, T., and Sivil, J. E., 2019, Facies, depositional environments, chemostratigraphy, and reservoir quality of the Middle Devonian Marcellus Formation, Appalachian Basin, northeastern Pennsylvania (abs.): American Association of Petroleum Geologists Annual

Convention and Exhibition (AAPG ACE), San Antonio, Texas, May 20.

Larson, T., Sivil, E., Hattori, K., Loucks, R., and Ruppel, S., 2019, Estimating lithologic facies in argillaceous and carbonate-rich mudrocks using X-ray fluorescence measurements and multivariate statistics (ext. abs.): AAPG Annual Convention and Exhibition, San Antonio, Tex., 19-22 May.

Reed, R. M., Ruppel, S. C., Baumgardner, R. W., Ramiro-Ramirez, S., and Sivil, J. E., 2019, Heterogeneity in a "shale" formation: lithologies in the Permian Wolfcamp Shale of the Delaware Basin, West Texas (abs.): Geological Society of America Abstracts with Programs, v. 51, no. 5, 1 p., <http://doi.org/10.1130/abs/2019AM-333267>.

Reed, R. M., Ruppel, S. C., Sun, X., Sivil, J. E., and Rowe, H. D., 2018, Lateral heterogeneity of microscale lithology and pore development in an Upper Cretaceous Eagle Ford Group horizontal core (abs.): AAPG Datapages/Search and Discovery Article, no. 90323, 1 p.

Reed, R. M., Ruppel, S. C., Sivil, J. E., and Rowe, H. D., 2017, Heterogeneity of microlithology in a Cretaceous Eagle Ford Group horizontal core (abs.): Geological Society of America Abstracts with Programs, v. 49, no. 6, 1 p., <http://doi.org/doi:10.1130/abs/2017AM-298869>.

Rowe, H., and Sivil, E., 2017, Preliminary chemostratigraphic record for the Devonian Three Forks Formation and associated units, North Dakota (abs.): AAPG Annual Convention and Exhibition, Houston, Tex., 2-5 April, AAPG Datapages/Search and Discovery Article No. 90291.

Rowe, H., Sivil, E., Hendrix, C., Narasimhan, S., Benson, A., Morrell, A., Torrez, G., and Mainali, P., 2017, Defining linkages between chemofacies and mechanical stratigraphy in the Austin Chalk: implications for geomechanics and induced fracture simulations (ext. abs.): SPE/AAPG/SEG Unconventional Resources Technology Conference, Austin, Tex., 24-26 July, <http://doi.org/10.15530/URTEC-2017-2668845>.

Rowe, H., Sivil, E., Morrell, A., Mainali, P., Torrez, G., Musgrove, A., and Garza, J., 2016, Applications and limitations of inorganic geochemical/chemostratigraphic records from the Devonian Three Forks Formation, North Dakota, USA (ext. abs.): SPE/AAPG/SEG Unconventional Resources Technology Conference, Austin, Tex., 24-26 July, <http://doi.org/10.15530/urtec-2017-2689130>.