UW – Green Bay Research Council

Grants-In-Aid of Research

Cover Page

Name: John Luczaj

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Address: ES-317

Budgetary Unit: NAS

Project Title: Heavy metals and radium analysis of Ancell Group groundwater beneath the National Railroad Museum in Ashwaubenon, Wisconsin.

This proposal is requesting funds for:

☒ First Priority Activities (Data/materials collection)

☐ Second Priority Activities (Travel to conference for research presentation)

Amount Requested: $380

Anticipated Dates: November 2010 - April 2010

Is Institutional Review Board (IRB) approval required? ☐ Y or ☒ N

Is Institutional Animal Care and Use Committee (IACUC) approval required? ☐ Y or ☒ N

If awarded funding, proposals are open to review upon request.

Proposals must be submitted as a single PDF document containing:

☐ Cover Page

☐ Proposal Narrative (Page limit: 3) (Refer to guidelines)

☐ Budget of Expenses (Page limit: 1) (Refer to guidelines)

- Use the template provided at www.uwgb.edu/rc/giar.htm

☐ Curriculum Vitae (Page limit: 2) (Refer to guidelines)

Electronic submissions only
Proposals must be received by 4:30 p.m. Monday, October 25, 2010.
E-mail your completed proposal as **a single PDF file** to nonnl@uwgb.edu
Late and/or incomplete applications will not be considered.

Institute for Research
WH 303
Phone: 2784/2565
Fax: 2043

UW-Green Bay Research Council Grants in Aid of Research Funds Request
John Luczaj – October 25, 2010

Project Title: Groundwater chemistry of Ancell Group groundwater beneath the National Railroad Museum in Ashwaubenon, Wisconsin

Overview

I am requesting new funding to analyze the groundwater chemistry for part of the deep aquifer beneath the National Railroad Museum (NRRM) in Ashwaubenon, Wisconsin. As part of a recently completed bedrock geologic mapping project, I had a 280-foot deep borehole/monitoring well installed at the museum that will serve as a convenient point of research on the deep aquifer water levels and chemistry. The well was installed at this location after the identification of a geologic fault line that runs through this part of the Green Bay area (See attached figure). The drill cuttings were analyzed and compared with existing well construction reports from the past 100 years to determine the amount of offset along the fault.

Arsenic and radium are both significant problems in the deep sandstone aquifers of northeastern Wisconsin (e.g., Johnson & Riewe, 2006; Grundl & Cape, 2006). While the distribution of arsenic-bearing minerals and the general release mechanisms for arsenic are understood, the actual distribution of arsenic in the deep aquifer waters is quite variable due to changing water levels (e.g., Luczaj and Hart, 2009). The distribution and release mechanisms for radium and other radionuclides, however, are not well understood. Recent work on my bedrock mapping project for Brown County has shown the presence of significant regional faults that likely penetrate several kilometers into the crust. It is possible that these faults could be conduits for radium-bearing waters that may replenish the deep aquifer system and could explain the lack of abundant uranium-bearing minerals within the aquifer.

Purpose of the Study

The main purpose for this research is two-fold. First, it is important to establish a baseline for the chemistry of the St. Peter Sandstone in central Brown County. With most municipal and industrial wells drilled into much deeper layers, the chemistry of this intermediate-depth aquifer is poorly understood.

Second, I believe that the close proximity of the NRRM well to the regional fault line might yield important clues about potential connections with the deep aquifer and the Precambrian basement rocks. A better understanding of the groundwater chemistry will help me to evaluate whether such connections exist. These analytical results will be included in future publications regarding the deep aquifer in the northeast Wisconsin Groundwater Management Area, of which Brown County resides.

References

Grundl, T., Cape, M. 2006. *Geochemical factors controlling radium activity in a sandstone aquifer.* Ground Water 44(4):518-527.

Johnson, D. and Riewe, T., 2006, Arsenic in northeastern Wisconsin. Well Water Journal, v. 60, p. 26- 31.

Luczaj, J.A. and Hart, D.J., 2009, Drawdown in the Northeast Groundwater Management Area (Brown, Outagamie, and Calumet Counties, WI). Final Project Report submitted to the Wisconsin Department of Natural Resources on July 3, 2009; 59 pages.

Curriculum Vitae – John A. Luczaj

Ph.D., Geology, Johns Hopkins University: Department of Earth & Planetary Sciences (May 2000). Dissertation: Epigenetic dolomitization and sulfide mineralization in Paleozoic rocks of eastern Wisconsin: Implications for fluid flow out of the Michigan Basin, U.S.A. 445 pages.

RESEARCH ARTICLES, MAPS, AND REPORTS (* = peer-reviewed journal)

Luczaj, J.A., 2009, Preliminary Geologic Map of Buried Bedrock Surface, 20 separate quadrangles for Brown County, Wisconsin. Submitted as part of Bedrock Geology of Brown County, Wisconsin STATEMAP Project, Years 1 & 2. 1:24,000 Scale.

Luczaj, J.A. and Hart, D.J., 2009, Drawdown in the Northeast Groundwater Management Area (Brown, Outagamie, and Calumet Counties, WI). Final Project Report submitted to the Wisconsin Department of Natural Resources on July 3, 2009; 59 pages.

Luczaj, J.A. and McIntire, M.J, 2008, Geochemical Characterization of Sulfide Mineralization in Eastern Wisconsin Carbonate Rocks. Final Project Report submitted to the UW Water Resources Institute on October 6, 2008; 13 pages, plus appendices and analytical results.

Luczaj, J. A. and Stieglitz, R, 2008, Geologic History of New Hope Cave, Manitowoc County, Wisconsin. The Wisconsin Speleologist, June 2008, p. 7-17.

*Luczaj, J. A., Harrison, W. B., III, and Williams, N. S., 2006, Fractured Hydrothermal Dolomite Reservoirs in the Devonian Dundee Formation of the Central Michigan Basin. AAPG Bulletin, v. 90, p. 1787-1801.

*Luczaj, J. A., 2006, Evidence against the Dorag (Mixing-Zone) model for dolomitization along the Wisconsin arch – A case for hydrothermal diagenesis. AAPG Bulletin, v. 90, p. 1719-1738.

Luczaj, J. A., 2006, Sulfur Isotopes from Mississippi Valley-Type Mineralization in Eastern Wisconsin. in, J. Day, J. Luczaj, and R. Anderson eds., New Perspecives and Advances in Understanding of Lower and Middle Paleozoic Epeiric Carbonate Depositional Systems of the Iowa and Illinois Basins. Iowa Geological Survey Guidebook Series, no. 25, p. 137-142.

Luczaj, J. A., 2001, A mineralized breccia pipe near Racine, Wisconsin: Evidence for post-Silurian igneous activity. in, R.D. Hagni ed., Studies on Ore Deposits, Mineral Economics, and Applied Mineralogy: With Emphasis on Mississippi Valley-type Base Metal and Carbonatite-related Ore Deposits: Univ. of Missouri-Rolla Press, p. 31-43.

*Luczaj, J. A. and Goldstein, R. H., 2000, Diagenesis of the Lower Permian Krider Member, southwest Kansas, U.S.A.: Fluid-inclusion, U-Pb, and fission-track evidence for reflux dolomitization during latest Permian time, *Journal of Sedimentary Research*, v. 70, p. 762-773.

*Luczaj, J. A., 1998, Regional and stratigraphic distribution of uranium in the Lower Permian Chase Group carbonates of southwest Kansas, *The Log Analyst*, v. 39, no. 4, p. 18-26.

*Luczaj, J. A., 1998, Argument Supporting Explosive Igneous Activity for the Origin of 'Cryptoexplosion' Structures in the Midcontinent, United States, *Geology*, v. 26, p. 295-298.

Presentations at Professional Meetings (last four years)

Hart, D., Gotkowitz, M., and **Luczaj, J.,** 2009 (submitted), Ambient Flow and Heterogeneity in Multi-Aquifer Wells. American Geophysical Union National Meeting in San Francisco, California, December 14-18, 2009.

Luczaj, J.A., McIntire, M.J., Steffel, A.M., and Duca, A.L., 2009, Geochemical Characterization of Sulfide Mineralization in Eastern Wisconsin Carbonate Rocks. American Association of Water Resources Wisconsin Section Meeting in Stevens Point, Wisconsin on March 5-6, 2009. (Poster Presentation).

Maas, J.C., Hart, D.J., and **Luczaj, J.A.,** 2009, Groundwater Recovery and Hydrostratigraphy in the Northeastern Groundwater Management Area of Brown, Outagamie, and Calumet Counties, Wisconsin. American Association of Water Resources Wisconsin Section Meeting in Stevens Point, Wisconsin on March 5-6, 2009. (Poster Presentation).

Luczaj, J.A., 2008, A Genetic Link between Hydrothermal Dolomite and MVT Mineralization in Eastern Wisconsin. American Association of Petroleum Geologists – Society of Petroleum Engineers – Eastern Section Meeting in Pittsburgh, Pennsylvania on October 14, 2008. (*Invited 30-minute oral presentation).

Hart*, D., **Luczaj, J. A.,** and Chase, P., 2008, A Large Scale Pumping Test in the Northeastern Wisconsin Groundwater Management Area. American Association of Water Resources Wisconsin Section Meeting in Brookfield, Wisconsin on March 6-7, 2008. (* oral presentation)

Luczaj, J. A., Millen, T., and Martin, J., 2007, A lead-isotopic study of Galena from Eastern Wisconsin: Evidence for lead sources in Precambrian basement rocks. Geological Society of America, North-Central/South Central Meeting in Lawrence Kansas on April 11-13, 2007. GSA Abstracts with Programs, v. 39, no. 3, p. 67. (Poster presentation)

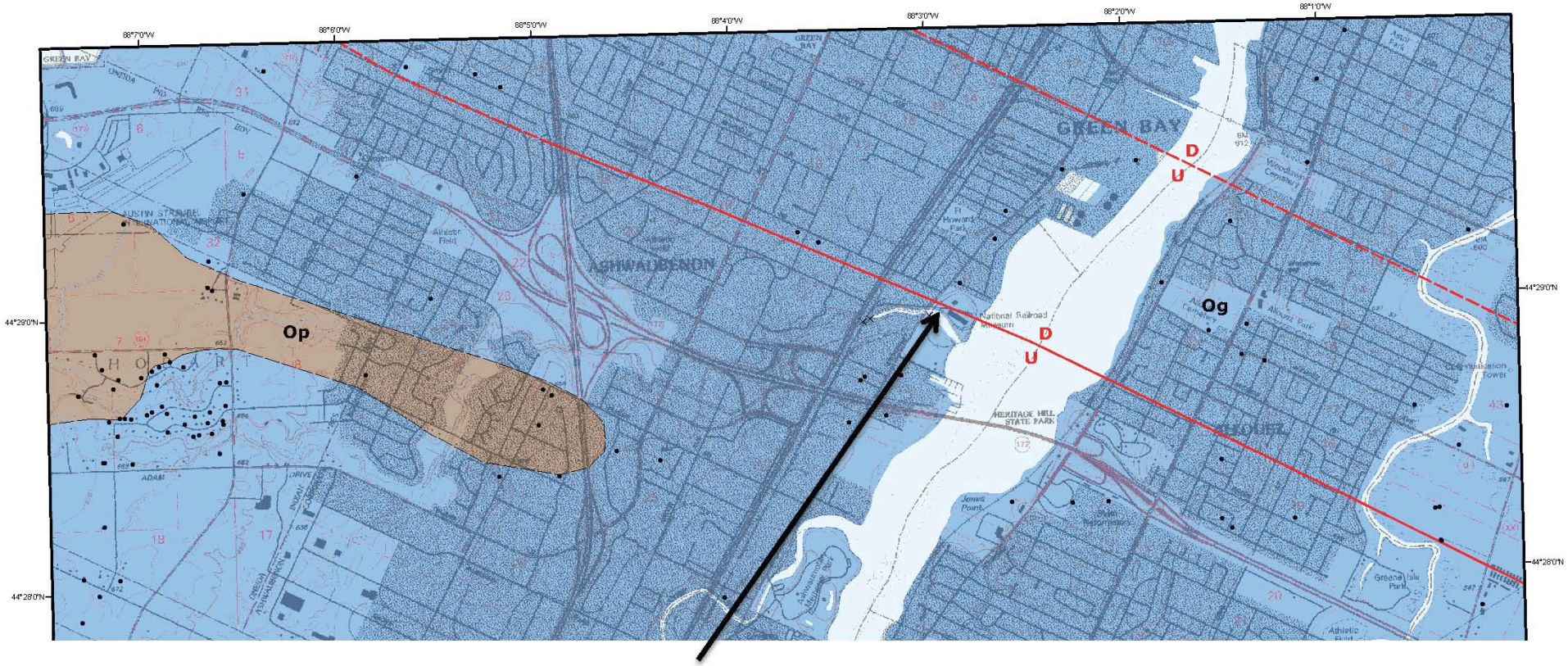
Professional Memberships

- American Association of Petroleum Geologists (1992)
- American Geophysical Union (1992)
- SEPM – Society for Sedimentary Geology (1995)
- Geological Society of America (1997)
- Society of Economic Geologists (2001)
- American Water Resources Association – Wisconsin Section (2006)
- National Association of Geoscience Teachers (2008)

Preliminary
Geologic map of buried bedrock surface
De Pere Quadrangle

John Luczaj

Brown County, Wisconsin



Arrow indicates the location of the new well at the National Railroad Museum. Red lines indicate faults in the region, with up and down displacement.

Grants in Aid Of Research Budget

Name of Applicant John Luczaj	**Budgetary Unit** NAS **Name of ADA (Academic Department Associate)** Carol Wautlet	**Telephone No.** (920) 465-5139

Budget Category	**Grant Request Amount**	**Match (Not Required)**	**Match Type** (i.e., monetary, service, or supplies) & **Source**
a. Research Supplies and Expenses Analysis of gross alpha and combined radium 226/228 ($200) Analysis of heavy metals suite (arsenic, nickel, cobalt, etc.) ($40) Analysis of general inorganic chemistry (Ca, Na, bicarbonate, hardness, etc.) ($120)	360		
b. Travel (mileage, lodging, meals) Name or number of people — Rate and distance and/or charge (Click for UW System Travel Regulations) Travel to Ashwaubenon National Railroad Museum Two trips @ 28 miles each round trip. Rate $0.365/mile	20.44		
c. Other			
TOTAL	**$380.44**	**0**	

Describe how funds will be utilized: The funds will pay for the collection and laboratory analysis of heavy metals, radioactive substances, and general inorganic chemistry of deep groundwater from a new borehole installed at the National Railroad Museum.