**Guillermo (Bill) Daniel Del Cul**

**Career Summary**

Guillermo (Bill) DelCul completed his BS in Chemistry in March of 1976 and his MS in Physical Chemistry at the La Plata National University in Argentina in December of 1977. During undergraduate and graduate school, he was a teaching and research assistant in general and inorganic chemistry. One of the topics of research was the extraction and purification of Zr, Hf and Th from natural deposits of sand in Argentina, and others included fluorine based chemistry.

He completed his Ph.D in Inorganic Chemistry at the University of Tennessee in December of 1990 working on chemistry and spectroscopy of transuranium elements at the Oak ridge National Laboratory.

His professional career started at the National Institute of Industrial Technology (Argentina) in 1978 working of gas chromatics separations for industrial applications. Then in 1981 he moved to an oil company as section head of thermodynamic studies to work on collecting deep samples from an oil field at the existing high pressures and temperatures using a remote tool and then simulating in the lab the evolution of the production conditions over time and chemical composition of oil and gas recoverable until the depletion of the reservoir.

In 1981 Bill joined the Argentina National Atomic Energy Commission and started working as a member of the enriched uranium laboratory group, one of the main activities included the recovery of highly enriched uranium from scrap and residues by extraction and purification by solvents extraction followed by selective precipitation, hydrofluorination and bomb reduction to metal. In 1985, Bill obtained a nuclear license as shift supervisor of the enriched uranium laboratory. In parallel the group was taking part of the design and construction of a pilot scale reprocessing plant based on the purex process and Bill was working on the development of the plutonium processing line. The plant was never completed and work stopped at the end of 1985.

Bill then moved to the USA and started working at Oak Ridge National Laboratory at the Chemical Technology Division in March 1986. During the initial years Bill worked as a member of a team developing grout-based waste form for a variety of nuclear wastes from Hanford, ORNL and Savannah River and in parallel Bill was working on his PhD. Dissertation related to the chemistry and spectroscopy of transuranic elements.

In 1990, Bill transferred to the K-25 plant and joined the technical division supporting the operations of the gaseous diffusion plants at Paducah and Portsmouth and the decontamination activities at the K-25 site.

In October 1993, Bill returned to ORNL to work in high temperature molten salts for different applications such as molten salt reactors, molten salt oxidation, gallium removal, accelerated driven system, navy applications, remediation of the Oak Ridge molten salt reactor, and fluoride volatility processes. Bill and Lee Trowbridge co-invented “TRU-FLUOR” an innovative fluoride volatility process for used nuclear fuel. In 1999, Bill join the ATW (Accelerated Transmutation of Wastes) program that had two parallel efforts based on aqueous and pyro-processing separations. Bill remained a key participant as the program evolved into the AAA (Advanced Accelerator Applications (AAA) that sequentially transitioned into the Advanced Fuel Cycle Initiative (AFCI), GNEP (Global Nuclear Energy Partnership), Fuel Cycle R&D, and more recently Materials Recovery and Waste Form Development (MRWFD).

Over the 30 plus years at ORNL, Bill activities evolved and varied over a wide range of topics including, development of advanced processes for recovery and reuse of most components in used nuclear fuel, and R&D on the processing and reprocessing of GenIV fuel (TRISO), testing of UF6 enrichment monitoring systems in support of the "Uranium Transparency Program," recovery and conversion of 233UF6 to a stable form for long-term storage, remediation activities at the ORNL MSRE reactor, R&D activities in high temperature molten salts, engineering study of the disposition alternatives of the Defense Logistic Agency thorium stockpile, and technical support related to the international weapons plutonium disposition program.

Presently, Bill is distinguished researcher of the Process Engineering and Research Group of the Nuclear Security and isotope Technology Division supporting renewed efforts related to the American centrifuge program, recovery of high-assay uranium from used fuels, molten salt reactors, and participating in several NSSA and DHS activities related to chemical signatures and observables in processes that could lead to the production of improvised devices and from clandestine enrichment facilities, while continuing working of an advanced-head for the processing of UNF and the recovery of Zr from UNF. As a long standing member of the American Nuclear society, Bill had several leadership roles at the Fuel Cycle and waste Management division as program chair, treasurer, vice-chair and chair of the division. He is presently a Fellow of ANS, member of ANS national program Committee and the program chair for the 2016 annual meeting.

**Professional Associations and Awards**

Member of Phi Kappa Phi Honor Society since 1989.

Recipient of the University of Tennessee Knoxville, Chemistry Department Departmental Merit Award 1989.

Recipient of the University of Tennessee Knoxville, Chemistry Department Departmental Merit Award for Graduating Students 1990.

Member of Sigma Xi Scientific Research Society since 1991.

Recipient of the Lockheed Martin Energy Research Corporation (LMER) Significant Event Award 1996.

Recipient of the LMER Significant Event Award 1998.

Recipient of the UT-Battelle Directors Award in 2008

Recipient of the Glenn T. Seaborg Actinide Separations Award in 2016

Member of the American Nuclear Society since 1996

Fuel Cycle and waste Management Division Program Assistant-Program-chair in 2010

Fuel Cycle and waste Management Division Program Program-chair in 2011

Fuel Cycle and waste Management Division Program Vice-chair in 2012

Fuel Cycle and waste Management Division Program Chair in 2013

Technical Program Chair of the 2016 Annual Meeting

Member of the National Program Committee 2013-Present

Fellow of the American Nuclear Society 2017

U.S.A. representative to the OECD/NEA Nuclear Science committee, Working party on Scientific issues on the fuel cycle (WPFC) since May 2015

**Patents**

U.S. Patent No. 8,574,523 on “Advanced Dry head-End Reprocessing of Light water Reactor Spent Nuclear Fuel, issued November,5, 2013.

U.S. Patent No. 8,747,790 on “Advanced Dry head-End Reprocessing of Light water Reactor Spent Nuclear Fuel, issued June 10, 2014.

U.S. Patent No. 8,999,168 on “Supported Liquid Inorganic Membranes for Nuclear Waste Separation”

issued on April 7, 2015 Inventors: Bhave, R. R., DeBusk, M. M., DelCul, G. D., Delmau, L.H., and Narula, C.K.

A patent disclosure was filed on 1/15/2015 for the “Direct Dissolution and Extraction of Voloxidized Nuclear Fuel” DOE S-NUMBER: S-138,094 Inventors: DelCul G.D, Spencer B.B., Hunt R. D. and Jubin R. T.

**Selected Publications**

DelCul, G. D., Hunt, R. D., Spencer, B. B., Johnson, J. A., and Jubin, R. T., “Development of an Advanced Dry Head-end for the Processing of Used Nuclear Fuel,” 39th Actinide Separations Conference, Salt Lake City, Utah, May 18–21, 2015

DelCul, G. D., Spencer, B. B., and McMurray, J. W., Synthesis of Uranium Borides and Uranium Silicides from Compounds Utilized in Nuclear Fuel Manufacture, ORNL/TM-2015/146, Oak Ridge National Laboratory, April 2015

DelCul, G. D., Hunt, R. D., and Spencer, B. B., Dry Route to Uranium Tetrafluoride via Nitrosylium Hexafluorouranate Intermediate and Characterization of Products, ORNL/TM-2015/138, Oak Ridge National Laboratory, April 2015

DelCul, G. D. and Spencer, B. B., “Processing of Graphite Based Nuclear Fuels: A Review,” American Nuclear Society 2014 Winter Meeting, Transactions of the American Nuclear Society, Vol. 111, Anaheim, CA, November 9–13, 2014.

DelCul G. D., Collins E. D. ,” How to Build Consensus for Future Recycle of Used Nuclear Fuel in the United States,” Actinide Separations Conference, Albuquerque NM, 2014.

DelCul G. D., Collins E. D., Spencer B. B., Hunt R. D. ,” Recovery, Purification, and Recycle of Zirconium from Used Nuclear Fuel Cladding,” Actinide Separations Conference, Albuquerque NM, 2014.

Travis, R. H., Counce, R. M., Watson, J. S., Spencer, B. B., and DelCul, G. D., “Water Solubility of Organic Solvents and Their Relationship to Extraction of Nitric and Acetic Acid From UREX+ Streams,” Separations Science and Technology, 48(14), 2164, 2013.

DelCul G. D.,Johnson J, J., Spencer B. B., Collins E. D., “Roadmap for Development of an Advanced Hean-End Process, Global 2013, Salt Lake City, Utah, 2013.

Collins E. D., Alexander C. W. DelCul G. D. Renier J. P., “Are Fast Reactors Necessary for Full Actinide Recycle,”, 2013 International High-Level Radioactive Waste Management Conference (IHLRWM), Albuquerque, New Mexico, 2013.

DelCul G. D., Collins E. D., Spencer B. B., “A Practical Path Forward for U.S. Used Nuclear Fuel,” 2013 International High-Level Radioactive Waste Management Conference (IHLRWM), Albuquerque, New Mexico, 2013.

G. D. DelCul, J. A. Johnson, B. B. Spencer, E. D. Collins, R. T. Jubin, and J. C. Bresee “Dry Pretreatment of Used Nuclear Fuel to Simplify Storage or Recycle – Shearing or Chemical Decladding and Voloxidation,” ANS Winter Meeting, San Diego, California, November 2012.

J. C. Bresee, A. R. Griffith, E. D. Collins, R. T. Jubin, and G. D. DelCul, "Chemical Pre-Treatment of Used Fuel for Long-Term Storage," Proceedings of Atalante 2012 International Conference, Montpellier, France (Sept. 2012).

Collins. E. D., DelCul, G. D., Spencer, B. B., Brunson, R. R., Johnson, J. A., Terekhov, D. S., and Emmanuel, N. V., “Process Development Studies for Zirconium Recovery/Recycle from Used Nuclear Fuel Cladding,” ATALANTE 2012 – Nuclear Chemistry For Sustainable Fuel Cycles, September 02–07, 2012.

DelCul, G. D., Johnson, J. A.,Hunt, R. D.,Collins, E. D.,Spencer, B. B., Jubin, R. T.,“Conceptual Design of a Simplified Head-End Process for the Recycling of Used Nuclear Fuel,” American Nuclear Society 2012 Annual Meeting, Chicago, Illinois, June 2012

DelCul, G. D., Collins, E. D., Benjer D., Vedder R. J., and Ellis R. J.” Macro TALSPEAK Separations of Am-CM from Fission Products - Implications for a Single Step Separation and Advanced Fuel Cycle Irradiation of Am-Cm,” Ninth International Conference on Methods and Applications of Radioanalytical Chemistry (MARC IX). Kailua Kona, Hawaii, March 2012

Russell, T. H., Garrison, J. R., Counce, R. M., Watson, J. S., Spencer, B. B., and Del Cul, G. D., “Evaluation of Annular Centrifugal Contactors for the Extraction of Acetic Acid from Aqueous Streams,” Separation Science and Technology, 47(10), pp. 1485–1491, July 2012.

DelCul G. D., Collins E. D., Terekhov D., Emmanuel V., “Recycle of Zirconium from Used Nuclear Fuel Cladding:A progress Report,” ANS 2011 Annual Meeting, Hollywood, Florida, 2011.

Collins E. D., Spencer B. B., DelCul G. D., “Importance of Decay Time and Other Time Factors on HLW Disposal,”, 2011 International High-Level Radioactive Waste Management Conference, Albuquerque New Mexico, 2011.

G. D. DelCul, Collins E. D. “U.S. Nuclear Energy Research and Development Program,” AECL Reuse 4 Workshop, Mississauga, Canada, 2010.

M. D. Laughter, C. E. Romano, J. D. White, J. M. Begovich, B.L. Broadhead, D. A. Clayton, E. D. Collins, G. D. DelCul, D. W.DePaoli, M.H. Ehinger, G. F. Flanagan, I. C. Gauld, S.R.Greene, R. A. Kisner, T. J. McIntyre, and J. M. Whitaker, “Recommendations for Development of an Integrated Nuclear Fuel Cycle Nonproliferation Strategy,” ORNL/TM-2010/133, 2010.

R. T. Jubin, W. S. Aaron, C. Ausmus, E. D. Collins, V. F. de Almeida, G. D. Del Cul, J. A. Johnson, B. D. Patton, R. J. Vedder, S. L. Voit, and C. F. Weber, “Development Of Advanced Cermet Waste Forms,” OECD/NEA 11th Information Exchange Meeting on Actinide and Fission Product Partitioning and Transmutation, San Francisco, November 1-5 2010.

G. D. DelCul, B. B. Spencer, R. D. Hunt, R. T. Jubin, and E. D. Collins, “Advanced Head End for the Treatment of Used LWR Fuel,” OECD/NEA 11th Information Exchange Meeting on Actinide and Fission Product Partitioning and Transmutation, San Francisco, November 1-5 2010.

Jessica Mitchell, Robert M. Counce, Jack S. Watson, B. B. Spencer, and G. D. Del Cul “Placing Acetic Acid Removal into the UREX+ Process,” Nuclear Technology, 170, 422-429, 2010.

DelCul, G. D., Collins, E. D., Spencer, B. B., and Jubin, R. T., “Long Term Storage of Used Fuel followed by Recycle and Reuse of Most Components as a Sustainable Path for Abundant Nuclear Energy,” 33rd Annual Actinide Separations Conference, Tahoe City, CA, May 18–21, 2009.

DelCul, G. D., Spencer B. B., Collins, E. D., Meeting of the U.S. (ORNL and INL) and the Korean Atomic Energy Research Institute on Advanced Voloxidation, Activities Progress Status at ORNL, June 4, 2009.

DelCul, G. D., Trowbridge, L. D., Renier, J. P., Ellis, R. J., Williams, K. A., Spencer, B. B., and Collins, E. D., Analysis of the Reuse of Uranium Recovered from the Reprocessing of Commercial LWR Spent Fuel, ORNL/TM-2007/207 (also as ORNL/GNEP/LTR-2008-002 and indexed as ORNL/TM-2009/023), UT-Battelle, Oak Ridge National Laboratory, January 2009.

DelCul G. D., D.F. Williams, R. D. Hunt, J. L. Collins, E. D. Collins, “Sphere-Pack: A Flexible Alternative for Transmutation Fuels and Targets,” 32nd Annual Actinide Separations Conference, Park City, Utah, May 12-15, 2008.

Mitchell, Jessica A., Johnson, Jared, Counce, R. M., Watson J. S.,Spencer, B. B., and Del Cul, G. D., "Extracting Acetic Acid from Acidic Solutions," Sep. Sci. & Tech, 43(9), pp. 2537-2547, July 2008.

Johnson, Jared, Mitchell, Jessica A., Counce, R. M., Watson J. S.,Spencer, B. B., and Del Cul, G. D., "Thermodynamics of Acetic Acid (aq)Calculated from the Modified Adsorption Isotherm Model for Aqueous Electrolytes," Sep. Sci. & Tech, 43(9), pp. 2548-2556, July 2008.

G. D. DelCul, L. D. Trowbridge, J-P Renier “Possible Recycle of Most Components from LWR Spent Fuel Including Uranium, Cladding, and Transuranium Elements,” American Nuclear Society Winter Meeting, Washington DC, Nov.11-15, 2007

Bonnesen P. V., Del Cul G. D., Hunt R. D., Ilgner R.H., Tomkins B. A., “Radiolysis of CSSX Solvents for Parsons Infrastructure & Technology Group in FY 2007 in Support of the Salt Waste Processing Facility at the Savannah River Site, ORNL/TM 2007/093, June 2007

R. D. Hunt, T. B. Lindemer, M. Z. Hu, G. D. Del Cul, and J. L. Collins, “Preparation of spherical, dense uranium fuel kernels with carbon,” Radiochim. Acta, 95, 225-232, 2007

Del Cul, G. D., Spencer, B. B., and Collins, E. D., “A New Paradigm: Near-Complete Recycling of Spent Fuel—A Path to Sustainable Nuclear Energy,” Proceedings of Global 2007 International Conference, Advanced Nuclear Fuel Cycles and Systems, Boise, Idaho, September 9–13, 2007

Del Cul, G. D., Trowbridge, L. D., Renier, J-P., Ellis, R. J., Spencer, B. B., and Collins, E. D., Engineering Alternative Studies for Separations: Preliminary Analysis on the Reuse of Uranium Recovered from the Processing of Commercial Light-Water Reactor Spent Fuel, EAS-G-ESR-G-00045, rev. 0, paper prepared by Oak Ridge National Laboratory for the Savannah River Site, June 2007

Del Cul, G. D., Spencer, B. B., and Collins, E. D., Engineering Alternative Studies for Separations: Potential Recovery of Zirconium and Other Metallic Components in Spent Fuel, EAS-G-ESR-G-00046, rev. 0, paper prepared by Oak Ridge National Laboratory for the Savannah River Site, June 2007.

G. D. Del Cul, R. R. Brunson, and L. K. Felker, “Sphere-Pac Technology for Remote Fabrication of Minor-Actinide Fuels and Targets, 2006 American Nuclear Society Winter Meeting, Albuquerque, New Mexico, November 12 16, 2006.

Spencer, B. B., DelCul, G. D., Mattus, C. H., and Collins, E. D., “Processing of Spent TRISO Coated Reactor Fuels: Milling of Fuel to Support a Grind Leach Process,” Transactions of the American Nuclear Society Annual Meeting, Reno, Nevada, June 4–8, 2006, Vol. 94, pp. 104–105.

Guillermo D. Del Cul, Barry B. Spencer, and Emory D. Collins, “Dissolution Off Gas Studies,” I NERI 4th. Program Review Meeting, ORNL—INL—KAERI, Idaho Falls, Idaho, April 25 26, 2006

Spencer, B. B., DelCul, G. D., Mattus, C. H., and Collins, E. D., “Processing of Spent TRISO Coated Reactor Fuels: Milling of Fuel to Support a Grind Leach Process,” Transactions of the American Nuclear Society Annual Meeting, Reno, Nevada, June 4–8, 2006, Vol. 94, pp. 104–105.

Del Cul, G. D., Hunt, R. D., Spencer, B. B., Collins, E. D., Westphal, B. R., and Howden, K. L., “Advanced Head End Processing of Spent Fuel: A Progress Report on a Pyrochemical Front End,” Transactions of the American Nuclear Society Annual Meeting, Reno, Nevada, June 4–8, 2006, Vol. 94, pp. 101 102.

R. R. Brunson, G. D. Del Cul, A. S. Icenhour, L. K. Felker, D. F. Williams, and E. D. Collins, “Preparation of Minor Actinide Oxides for Sphere-pac Transmutation Fuels,” 30th Annual Actinide Separations Conference, Environmental and Molecular Science Laboratory, Pacific Northwest National Laboratory, Richland, Washington, May 22 25, 2006.

E. D. Collins, D. E. Benker, L. K. Felker, R. D. Taylor, G. D. Del Cul, B. B. Spencer, W. D. Bond, and D. O. Campbel, “Hot Test Evaluation of the Reverse Talspeak Process,” 7th International Conference GLOBAL 2005, Tsukuba International Congress Center, Tsukuba, Ibaraki ken, Japan, on 9 13, October 2005.

Barry B. Spencer, Guillermo D. Del Cul, Catherine H. Mattus, and Emory D. Collins, “TRISO Coated Spent Fuel Processing using a Grind Leach Head End,” 7th International Conference GLOBAL 2005, Tsukuba International Congress Center, Tsukuba, Ibaraki ken, Japan, on 9 13, October 2005.

Guillermo D. Del Cul, Barry B. Spencer, and Emory D. Collins, “Hybrid Processing of Spent Fuel,” 7th International Conference GLOBAL 2005, Tsukuba International Congress Center, Tsukuba, Ibaraki ken, Japan, on 9 13, October 2005.

B.R. Westphal, K.J. Bateman, R.P. Lind, K.L. Howden, and G.D. Del Cul, “Fission Product Removal from Spent Oxide Fuel by Head end Processing,” 7th International Conference GLOBAL 2005, Tsukuba International Congress Center, Tsukuba, Ibaraki ken, Japan, on 9 13, October 2005.

G. D. Del Cul, C. H. Mattus, A. S. Icenhour, L. K. Felker, D. F. Williams, “Fuel Fabrication Development for the Surrogate Sphere pac Rodlet, ” ORNL/TM 2005/108, May 2005.

Zuojiang Li, Guillermo D. Del Cul, Wenfu Yan, Chengdu Liang, Sheng Dai, “Fluorinated Carbon with Ordered Mesoporous Structure,”Journal of the American Chemical Society, 126, 12782-12783, 2004.

E. D. Collins, J. P. Renier, G. D. DelCul, and B. B. Spencer, “Implications of Recent Calculations on Actinide Partitioning in Light Water Reactors (LWRs),” 28nd Annual Actinide Separations Conference (Asheville, North Carolina), June 7 10, 2004.

Del Cul, G. D., Hunt, R. D., Spencer, B. B., Collins, E. D., Bateman, K., Howden, K., and Westphal, B., Advanced Head End Processing of Spent Fuel: A Progress Report, Transactions of the American Nuclear Society Winter Meeting, Washington, D.C., November 14 18, 2004, Vol. 91, pp. 507 508.

J. L. Collins, R. D. Hunt, G. D. Del Cul, and D. F. Williams, “Production of Depleted UO2 Kernels for the Advanced Gas Cooled Reactor Program for Use in TRISO Coating Development,” ORNL/TM 2004/123, November 2004.

Spencer, B. B., Mattus, C. H., Del Cul, G. D., Hunt, R. D. and Collins, E. D., Scoping Experiments on Processing of Spent TRISO Coated GEN IV Reactor Fuels, Transactions of the American Nuclear Society Winter Meeting, Washington, D.C., November 14 18, 2004, Vol. 91, pp. 525 526.

Westphal, B. R., Bateman, K. J., Lind, R. P., Howden, K. L., Goff, K. M., Del Cul, G. D., Spencer, B. B., and Collins, E. D., Results of Phase I Testing for the DEOX Process, Transactions of the American Nuclear Society Winter Meeting, Washington, D.C., November 14 18, 2004, Vol. 91, pp. 519 520.

Collins, E. D., Benker, D. E., Felker, L. K., Taylor, R. D., Del Cul, G. D., Spencer, B. B., Bond, W. D., and Campbell, D. O., Minor Actinide Separation Process Development, The Eighth Information Exchange Meeting on Actinide and Fission Product Partitioning and Transmutation (Nuclear Science Committee of the OECD NEA, Las Vegas, Nevada, November 9 11, 2004), Programme and Abstracts, pp. 69 70.

Lee D. Trowbridge, Guillermo Del Cul, Barry Spencer, and Emory D. Collins, “Advanced Spent Fuel Processing Based on Fluorination and Volatility of Fluoride Species: The Trufluor Concept,” ANS 2004 Annual Meeting, Pittsburg PA, June 13 17, 2004.

D. T. Ingersoll, C. W. Forsberg,,L. J. Ott, D. F. Williams, J. P. Renier, D. F. Wilson, S. J. Ball, L. Reid,W. R. Corwin, G. D. Del Cul, “ Status of Preconceptual Design of the Advanced High Temperature Reactor (AHTR),” ORNL/TM 2004/104, May 2004.

L. D. Trowbridge, G. D. Del Cul, and D. W. Simmons, “Laboratory scale UF6 Test Bed Supporting Nonproliferation Research and Development,” 7th International Conference on Facilities Operations Safeguards Interface, February 29 March 5, 2004,Charleston, South Carolina, USA

Emory D. Collins, John Paul Renier, Bill Del Cul and Barry Spencer, “Implications of Recent Calculations on Actinide Partitioning and Transmutation in Light Water Reactors,” 2004 Actinide Separations Conference, June 10, 2004, Asheville, North Carolina

G. D. Del Cul, B. B. Spencer, and E. D. Collins or ORNL, and K. Bateman, K. Howden, and B. Westphal, “Advanced Head End Processing of Spent Fuel,” ANS Winter Meeting, Washington DC, November 14 18, 2004

G. D. Del Cul, B. B. Spencer, and E. D. Collins, “Advanced Head End Processing of Spent Fuel,” The Eighth Information Exchange Meeting on Actinide and Fission Product Partitioning and Transmutation, Nuclear Science Committee of the OECD NEA, Las Vegas, Nevada, November 9–11, 2004.

G. D. Del Cul, B. B. Spencer, C. W. Forsberg, E. D. Collins and W. S. Rickman, “Processing of Triso-coated Fuel in Support of High-temperature Gas-cooled Reactors,” Transactions of the American Nuclear Society, 88, 376-377, June 2003.

G. D. Del Cul, B. B. Spencer, and E. D. Collins, “Fuel Cycle Advantages Resulting from the Significant Inventory of U.S. Spent Fuel,” to be presented at Global 2003, ANS-ENS International Winter Meeting, New Orleans, Louisiana, November 16-20, 2003.

B. B. Spencer, G. D. Del Cul, and E. D. Collins, “Effect of Scale on Capital Costs of Nuclear Fuel Reprocessing,” to be presented at Global 2003, ANS-ENS International Winter Meeting, New Orleans, Louisiana, November 16-20, 2003.

L. D. Trowbridge, G. D. Del Cul, and D. W. Simmons, “Laboratory Scale UF6 Test Bed Supporting Nonproliferation Research and Development,” to be presented at Global 2003, ANS-ENS International Winter Meeting, New Orleans, Louisiana, November 16-20, 2003.

C. W. Forsberg, G. D. Del Cul, B. B. Spencer, and E. D. Collins “A New Repository Waste Form: Graphite–carbon High–level Waste,” 2003 International High-Level Radioactive Waste Management Conference, Las Vegas, Nevada, March 30-April 2, 2003.

DelCul, G. D., Spencer, B. B., Forsberg, C. W., Collins, E. D., and Rickman, W. S., “TRISO-Coated Fuel Processing to Support High-Temperature Gas-Cooled Reactors,” ORNL/TM-2002/156, UT-Battelle, Oak Ridge National Laboratory, September 2002.

G. D. Del Cul, A. S. Icenhour, D. W. Simmons, and L. D. Trowbridge, “Present Status of the Recovery and Processing of 233U from the Oak Ridge Molten Salt Reactor Experiment Remediation Activities," invited presentation at the American Nuclear Society, 5th Topical Meeting on Spent Nuclear Fuel and Fissile Materials Management, Francis Marion Hotel, Charleston, South Carolina, September 17-20, 2002.

L. D. Trowbridge, A. S. Icenhour, G. D. Del Cul, and D. W. Simmons, “Radiolytic Processes During Intermediate Stages of 233U Removal from the Oak Ridge Molten Salt Reactor Experiment," invited presentation at the American Nuclear Society, 5th Topical Meeting on Spent Nuclear Fuel and Fissile Materials Management, Francis Marion Hotel, Charleston, South Carolina, September 17-20, 2002.

A. S. Icenhour, L. M. Toth, H. Luo, and G. D. Del Cul, “Overview of Water Sorption and Gamma Radiolysis Studies for the Long-term Storage of 233U Oxides," invited presentation at the American Nuclear Society, 5th Topical Meeting on Spent Nuclear Fuel and Fissile Materials Management, Francis Marion Hotel, Charleston, South Carolina, September 17-20, 2002

D. F. Williams, G. D. Del Cul, L. M. Toth and J. Caja, “Redox Control of MSR Fuel,” Gedeon-practis Workshop the Molten Salt Reactors (MSR): Pyrochemistry and Fuel Cycles for Innovative Nuclear Systems, Château de Cadarache, Saint-paul-lez-durance, France, GEDEON GROUP: CEA, CNRS, EDF, Framatome, June 19-20, 2002.

G. D. Del Cul, W. L. Ohlinger, L. M. Toth, and D. F. Williams, “Liquid Density and vapor Pressure of Selected Fluoride Salt candidates for high Temperature Heat Transport Media,” presentation at the “ Thirteen International Symposium on Molten Salts, 201st Meeting of the Electrochemical Society,” Philadelphia Marriot, Philadelphia, Pennsylvania, May 12-17, 2002.

G. D. Del Cul, W. L. Ohlinger, L. M. Toth, and D. F. Williams, “Liquid Density and vapor Pressure of Selected Fluoride Salt candidates for high Temperature Heat Transport Media,” presentation at the “ Thirteen International Symposium on Molten Salts, 201st Meeting of the Electrochemical Society,” Philadelphia Marriot, Philadelphia, Pennsylvania, May 12-17, 2002.

A. S. Icenhour, L. M. Toth, G. D. Del Cul, L. F. Miller, “Gamma Radiolysis Studies of Uranyl Fluoride,” Radiochimica Acta, 90, 109, 2002.

G. D. Del Cul, W. H. Hermes, T. D. Hylton, J. B. Knauer, C. H. Mattus, P. T. Singley, B. B. Spencer, S. N. Storch, J. W. Terry, and R. J. Vedder, “Thorium nitrate Inventory Definition Report,” ORNL/TM-2000/163, 2001.

G. D. Del Cul, W. H. Hermes, T. D. Hylton, J. B. Knauer, C. H. Mattus, P. T. Singley, B. B. Spencer, S. N. Storch, J. W. Terry, and R. J. Vedder, “Executive Summary Report for the Thorium Nitrate Stockpile Stewardship and Disposition Project,” ORNL/TM-2001/14, 2001.

A. S. Icenhour, D. F. Williams, L. D. Trowbridge, L. M. Toth and G. D. Del Cul,"An overview of Radiolysis studies for the Molten Salt Reactor Remediation Project," Invited presentation an conference paper at Global 2001 Conference, Paris, France, September 9-13, 2001.

G. D. Del Cul, A. S. Icenhour, D. W. Simmons, L. D. Trowbridge, D. F. Williams, and L. M. Toth, "Overview of the Recovery and Processing of 233U from the Oak Ridge Molten Salt Experiment (MSRE) Remediation Activities,” Invited oral presentation and conference paper at Global 2001 Conference, Paris, France, September 9-13, 2001.

D. F. Williams, G. D. Del Cul, L. M. Toth, and E. D. Collins, “The Influence of Lewis Acid-Base Chemistry in the Removal of Gallium by Volatility from Weapons-Grade Plutonium Dissolved in Molten Chlorides,” Nuclear Technology, 136, 367-369, 2001.

G. D. Del Cul, A. S. Icenhour, D. W. Simmons, “Development of the Process for the Recovery and Conversion of 233UF6 Chemisorbed in NaF Traps from The Molten Salt Reactor Remediation Project,” Nuclear Technology, 136, 89, October 2001.

G. D. Del Cul, L. M. Toth, W. D. Bond, and D. F. Williams, “Evaluation of Processes that Might Lead to Separation of Actinides in Waste Storage Tanks Under Alkaline Conditions,” Separation Science and Technology, 35, 2127-2141, 2000.

G. D. Del Cul, D. F. Williams, E. D. Collins, and L. M. Toth, “Lewis-Acid effects on Gallium Volatility in Molten Chlorides,” Workshop for Defining Joint Research in Support of the Russian Plutonium Conversion Program, Los Alamos, NM, July 14-19,2000.

D. F. Williams, G. D. Del Cul, E. D. Collins, and L. M. Toth, “Evaluation of Processes for U+Pu conversion,” Workshop for Defining Joint Research in Support of the Russian Plutonium Conversion Program, Los Alamos, NM, July 14-19,2000.

G. D. Del Cul, A. S. Icenhour, and D. W. Simmons, “Conversion of 233UF6 to U3O8 for Long-Term Storage, invited presentation at the ANS/ENS 2000 International Winter Meeting, Washington, D. C., November 12-16, 2000.

G. D. Del Cul, D. F. Williams, E. D. Collins, and L. M. Toth, “Lewis-Acid effects on Gallium Volatility in Molten Chlorides,” Workshop for Defining Joint Research in Support of the Russian Plutonium Conversion Program, Los Alamos, NM, July 14-19,2000.

G. D. Del Cul, A. S. Icenhour, and D. W. Simmons, Prototype Tests for the Recovery and Conversion of UF6 Chemisorbed in NaF Traps for the Molten Salt Remediation Project, ORNL/TM-2000-92, April 2000.

97)

G. D. Del Cul, W. H. Hermes, P. T. Singley, R. D. Spence, B. Spencer, L. D. Trowbridge, K. L. Walker, C. C. Wynn, Engineering Studies of the Disposition of Uranium-233: Process Nonweapons-usable 233U through the high Level Waste Tanks at Savannah River Site, ORNL-DES-T02, May 2000

G. D. Del Cul, A. S. Icenhour, D. W. Simmons, “Conversion of 233U-containing Materials into a Stable Oxide for Long-term Storage,” ACS 219th National Meeting, San Francisco, California, March 26-30, 2000.

G. D. Del Cul, L. D. Trowbridge, L. M. Toth, J. N. Fiedor, “Some Investigations of the Reaction of Activated Charcoal with Fluorine and Uranium Hexafluoride,” Journal of Fluorine Chemistry, 101, 137-148, 2000

A. S. Icenhour, L. M. Toth, G. D. Del Cul, D. F. Williams, and L. D. Trowbridge, “Radiolysis Studies for the Long-term Storage of 233Uranium Oxides" invited presentation and paper to American Nuclear Society 1999 Winter Meeting, Nov. 14-18, 1999, Long Beach, California

D. F. Williams, G. D. Del Cul, and L. M. Toth, “Molten Salt Fuel Requirements for ADTT Applications,” invited presentation and paper to the 3rd International Conference on Accelerator Driven Transmutation Technologies and Applications (ADTTA ‘99), June 7-11, Prague, Czech Republic, 1999.

V.A. Narayanan, N.S. Stump, G.D. Del Cul, T. J. Vo-Dinh, “Vibrational spectrum of strychnine: detection at the nanogram level using a Raman microscope," J. Raman Spectrosc., 30, 435-39, June1999

L. Maya, E. W. Hagaman, R. K. Williams, X. -D. Wang, G. D. Del Cul, and J. N. Fiedor, Carbon in -Platinum Dioxide, J. Phys. Chem. B, 102, 1951, 1998.

G. D. Del Cul, A. S. Icenhour, D. W. Simmons, J. Caja, L. M. Toth, “ The Uranium Fluoride-to-Oxide Conversion Process in the Molten Salt Reactor Experiment Remediation Project,” 22nd Annual Actinide Separation Conference, Chattanooga Choo Choo Holiday Inn, April 20-23, 1998.

W. Hagaman, D.K. Murray, and G. D. Del Cul, "Solid State 13C and 19F NMR Characterization of Fluorinated Charcoal," Energy & Fuels, Vol. 12, 399-408, 1998

G. D. Del Cul, L. D. Trowbridge, D. W. Simmons, D. F. Williams, and L. M. Toth “Passivation of Fluorinated Activated Charcoal,” ORNL/TM –13506, October 1997

D.F. Williams, J.C. Rudolph, G.D. Del Cul, S.L. Loghry, D.W. Simmons, L.M Toth, , "Laboratory Tests Using Chlorine Trifluoride in Support of Deposit Removal at MSRE," ORNL/TM-13403, 1997

E.W. Hagaman, D.K. Murray, G.D. Del Cul,"The Fluorination of Charcoal with Elemental Fluorine," 23rd Biennial Conf. on Carbon, Pennsylvania State Univ., State College, PA, July 13,1997

G. D. Del Cul, L. M. Toth, W. D. Bond, S. Dai, “Evaluation of Possible Physical-Chemical Processes that Might Lead to Separations of Actinides in ORNL Waste Tanks,” ORNL/TM-13326, 1997

G. D. Del Cul, A.S . Icenhour, L.M. Toth, "Conversion of Uranium-Containing Materials Retrieved from the Molten Salt Reactor Experiment (MSRE) into Stable Oxides for Final Storage/Disposition," ORNL/CF-97/41, 1997

G. D. Del Cul, L. M. Toth, W. D. Bond, S. Dai, and D. Metcalf, "Cold Tests on a Citrate-Based 'TALSPEAK' Lanthanide-Actinide Separation Process," Separation Science and Technology, 32, 431-446, 1997.

D. F. Williams, L. M. Toth, and G. D. Del Cul, “Chemical interactions during Melting of the MSRE Fuel Salt,” ORNL/M-5506, 1996

S. Dai, D.H. Metcalf, G.D. Del Cul, and L.M. Toth, “Spectroscopic Investigation of Photochemistry of Uranyl-doped Sol-Gel Glasses Immersed in Ethanol”, Inorg. Chem., 35, 26, 7786-90, 1996

G. D. Del Cul, L. M. Toth, David F Williams, S. Dai,“Some Investigations on the Chemistry of Activated Charcoal, with Uranium Hexafluoride, and Fluorine,” ORNL/TM-13052, 1998

G. D. DelCul, J.C. Rudolph, D. F. Williams, S. Dai, and L. M. Toth, “Chemical Aspects of the Trapping and Recovery of Uranium Hexafluoride and Fluorine During Remediation Activities at the Molten Salt Reactor Experiment (MSRE),” 211th Annual National Meeting, American Chemical Society, March 24-29,New Orleans 1996.

L.M Toth, G.D. Del Cul, W.D Bond,, "Possible Physical-Chemical Process That Might Lead to Separations of Actinides in ORNL Waste Tanks," ORNL/CF-96/48, 1996.

D.H. Metcalf, S. Dai, G.D. Del Cul, and L.M. Toth, "Luminescence Spectra of Single Crystals of Cs2ZrCl6:UO2Cl42- at Low Temperatures. Vibronic Structure of UO22+ doped in a Cubic Host.", Inorg. Chem., 34, 5573, 1995.

W. Xu, S. Dai, L. M. Toth, G. D. Del Cul, and J. R. Peterson, "Effect of Curing Temperature on Green Light Emission From Er3+-Doped Sol-Gel Silica Glass", J. Non-Cryst. Solids, 194, 235, 1996.

S. Dai, L. M. Toth, G. D. Del Cul and D. H. Metcalf, "Near-IR Absorption Transition of 3H4 to 3F2 for UCl62- Complex in M2ZrCl6 Host Crystals (M = K+, Rb+, and Cs+) : An Experimental and Theoretical Study", Chem. Phys., 200, 271, 1995.

S. Dai, L. M. Toth, G. D. Del Cul and D. H. Metcalf, “Solubilities of Uranium(IV) Dioxide in Magnesium Chloride, Calcium Chloride and Aluminum Chloride Melts: A Comparative Study," J. Phys. Chem., 100, 220-223, 1996.

G. D. Del Cul, L. M. Toth, David F Williams, S. Dai, and J. N. Fiedor, “Some Investigations on the Chemistry of Activated Charcoal, with Uranium Hexafluoride,and Fluorine,” ORNL/TM-13052, 1995.

W. D. Bostick, P. E. Osborne, G. D. DelCul, and D. W. Simmons, “Treatment of Aqueous Solutions Contaminated with Technetium-99 Originating from Uranium Enrichment Activities: Final Report,” K/TCD-1120, 1995.

W. D. Bond, G. D. Del Cul, G. D. Davis, and L. M. Toth. “Radionuclides Transport and Colloid Formation During Sludge Washing,” 19th Annual Actinide Separations Conference, Marriot Monterey, California, June 12-15, 1995.

G. D. Del Cul, L. M. Toth, D. F. Williams, D. H. Metcalf, S. Dai “Uranium Separation and Transport in the Molten Salt Reactor Experiment,”, 19th Annual Actinide Separations Conference, Monterey Marriot Monterey,California , June 12-15, 1995.

D.H. Metcalf, S. Dai, G.D. Del Cul, and L.M. Toth, "Luminescence Spectra of Single Crystals of Cs2ZrCl6:UO2Cl42- at Low Temperatures. Vibronic Structure of UO22+ doped in a Cubic Host.", Inorg. Chem., 34, 5573, 1995.

G. D. Del Cul, L. M. Toth, S. Dai, and D. Metcalf , "Molten Fluoride Fuel Salt Chemistry,", Invited Oral Presentation. Presented at the Space Nuclear Power Conference, Alburquerque, New Mexico, January 9-11, 1995.

W. Xu, S. Dai, L. M. Toth, G. D. Del Cul, and J. R. Peterson, "Influence of Temperature on the Green-to-blue Up-conversion Emission from U4+ Ion in Single-crystal Cs2ZrCl6," Journal of Solid State Chemistry, 116 ,113-117 (1995).

W. Xu, S.Dai, L. M. Toth, G. D. Del Cul, and J. R. Peterson, "Green Upconversion Emission from Er+3 Ion Doped into Sol-Gel Silica Glasses under Red Light (647.1 nm) Excitation," J. Phys. Chem. 99, 4447-4450 (1995).

G. D. Del Cul and W.D. Bostick, "Simple Method for Technetium Removal from Aqueous Solutions," Nuclear Technology, 109(1), 161-2, 1995.

Citrate-Based "TALSPEAK" Lanthanide-Actinide Separation Process, G. D. Del Cul, L.M. Toth, W. D. Bond, G. D. Davis, S. Dai, and D. Metcalf, ORNL/TM-12875, June 1994.

G. D. Del Cul, L. M. Toth, S. Dai, and D. Metcalf, "Molten Fluoride Fuel Salt Chemistry,", Session XII (TH2) Separations, International Conference on Accelerator-Driven Transmutation Technologies and Applications, Las Vegas, July 25-29, 1994.

G. D. Del Cul, L. M. Toth, W. D. Bond, G. D. Davis, S. Dai, and D. Metcalf, "Citrate-Based "TALSPEAK" Lanthanide-Actinide Separation Process," Eighteen Annual Actinide Separation Conference, Aqueous Session, page 26, Abstracts, Tamarron Resort, Durango, Colorado, May 23-26, 1994.

D. Metcalf, S. Dai, G. D. Del Cul, and L. M. Toth "Photolysis of UO2(NO3)2 in Ethanol Glasses at Cryogenic Temperatures. Identification of Reduced Uranium Species," Eighteen Annual Actinide Separation Conference, Separation Chemistry Session, page 44, Abstracts, Tamarron Resort, Durango, Colorado, May 23-26, 1994.

G. D. Del Cul, S. Dai, L. M. Toth, and D. Metcalf, "Molten Fluoride Fuel Salt Chemistry Eighteen Annual Actinide Separation Conference, Plutonium Disposition Session, page 76, Abstracts, Tamarron Resort, Durango, Colorado, May 23-26, 1994.

Sheng Dai, L. M. Toth, G. D. Del Cul and D. H. Metcalf, "Ultraviolet-visible absorption spectrum of C60 Vapor and Determination of the C60 vaporization enthalpy," J. Chem. Phys., 101(5), 4470-4471, 1994

G. D. Del Cul, P. E. Osborne, and W. D. Bostick,"Technetium-99 Removal from Process Solutions and Contaminated Groundwater," Journal of Separation Science and Technology, 28, 89,1993.

N. A. Stump G. M. Murray, G. D. Del Cul, R. G. Haire and J. R. Peterson "Stokes and Anti-Stokes Luminescence from the Trihalides of Curium-248,", Radiochimica Acta, 61, 129,1993.

G. D. Del Cul "Oak Ridge K-25 Site Technology Logic Diagram,” Waste Management Section, DOE/K-2073 and ORNL/M-2751, 1993.

G. D. Del Cul, P. E. Osborne, and W. D. Bostick,""Technetium-99 Removal from Process Solutions and Contaminated Groundwater," Journal of Separation Science and Technology, 28, 89,1993.

G. D. Del Cul, R. E. Adamski, W. A. Slover, P. E. Osborne, W. D. Bostick, R. L. Fellows, T. L. White Solidification of Waste Sludges Using Microwave Heating, , DOE K/TCD-1080, August 1993.

G. D. Del Cul, S. E. Nave, and J. R. Peterson, "Polarized Raman Spectra of Single-Crystal Lanthanide Oxychlorides," Rare Earth'92 in Kyoto, Kyoto, Japan, June 1-5, 1992. Published in Journal of Alloys and Compounds, 193, 1993.

G. D. Del Cul, R. G. Haire and J. R. Peterson, “Effects of Pressure on the Luminescence, Raman and Absorption Spectra of 248CmCl3,” J. of Alloys and Compounds, 181, 63, 1992.

S. Dai, G. D. Del Cul, N.A. Stump, and J. R. Peterson,"Absorption Spectrum from Europium Ions in Europium Oxychloride," Spectroscopy Letters, 25(7), 1003-1010, 1992.

G. D. Del Cul, S. E. Nave, G. M. Begun, and J. R. Peterson, "Raman Spectra of Tetragonal Lanthanide Oxychlorides Obtained from Polycrystalline and Single Crystal Samples," Journal of Raman Spectroscopy, 23, 267, 1992.

G. D. Del Cul, I. L. Morgan, W. D. Bostick, and P. E. Osborne, “Grout-Based Waste Forms for the Solidification of Anion-Exchange Resins. Final Report, DOE K/TCD-1004, November 1991.

G. D. Del Cul, P. E. Osborne, D. E. Beck, and W. D. Bostick Evaluation of Alternatives for BAT Treatment and Retreatment of Uranium-Contaminated Wastewater at the Paducah Gaseous Diffusion Plant C-400 Facility, Progress Report, DOE/K/QT-394-1, DOE/K/QT-394-2 and DOE/K/QT-394-3, 1991.

G. D. Del Cul and T. M. Gilliam, “Development of an In-Line Grout Meter for Improved Quality Control:Final Report,” DOE/ORNL/TM-11771, May 1991.

G. D. Del Cul, J. Braunstein, and H. Perez-Blanco,"Experimental Study of The Effect of Additives on Mass Transfer to an Aqueous Solution of Lithium Bromide," in The National Heat Transfer Conference, The American Society of Mechanical Engineers (ASME), Minneapolis, Minnesota, 1991. Published in ASME 91-HT-17.

G. D. Del Cul, “Luminescence, Raman and Absorption Spectrophotometric Studies of Selected Lanthanide and Actinide Compounds in the Solid State,” Doctoral Dissertation, The University of Tennessee, DOE/ER/13865-029, 1991.

R. H. Reiner , G. D. Del Cul, H. Perez-Blanco, M. Ally, and A. Zaltash, “Evaluation of Potential Performance Additives for the Advance LiBr Chiller, DOE/ORNL/CON-318, April 1991.

G. D. Del Cul, G. M. Murray, S. E. Nave, C-T. P. Chang, G. M. Begun, and J. R. Peterson, "Luminescence, Absorbance and Raman Studies of Europium Oxychloride at various pressures," in First International Conference of f-elements, Leuven, Belgium, September 4-7, 1990. Published in the European Journal of Solid State and Inorganic Chemistry, 28, 155-158, 1991.

G. M. Murray, G.D. Del Cul, S. E. Nave, C-T. P. Chang, R. G. Haire, and J. R. Peterson, "Anti-Stokes Luminescence of Selected Actinide(III) Compounds," in First International Conference of f-elements, Leuven, Belgium, September 4-7, 1990. Published in the European Journal of Solid State and Inorganic Chemistry, 28, 105-108, 1991.

"Anti-Stokes Luminescence of Selected Curium Compounds," G. M. Murray, G. D. Del Cul, G. M. Begun, J. P. Young, and J. R. Peterson, American Chemical Society Meeting, Abstract 69, Boston, April 22-27, 1990.

G. M. Murray, G. D. Del Cul, G. M. Begun, R. G. Haire, J. P. Young, and J. R. Peterson, "Anti-stokes Luminescence of Selected 248Curium(III) Compounds," Chemical Physics Letters, 168(5), 1990.

G. M. Murray, G. D. Del Cul, R. V. Sarrio, and J. R. Peterson,"Correlation of Raman Phonon and Europium (III) Luminescence Spectra as a Probe of Structure in Trisodium Tris(2,6-Pyridinedicarboxylato) Lanthanide(III) Compounds," in First International Conference of f-elements, Leuven, Belgium, September 4-7, 1990.

G. M. Murray, G. Del Cul, and J. R. Peterson, in First International Conference of f-elements,"The Effects of Hydration on the Fluorescence Spectra of Trisodium Tris(2,6 pyridinedicarboxylato) Europium(III) Compounds," Leuven, Belgium, September 4-7, 1990.

Development of Immobilization Technology for Hanford Double-Shell Slurry Feed Waste, O. K. Tallent, E. W. McDaniel, G. D. Del Cul, K. E. Dodson, and D. R. Trotter, ORNL/TM 10906, August 1989.

W. R. Wilmarth, G. D. Del Cul, R. G. Haire, and J. R. Peterson,"Characterization of Selected Solid-state Actinide Compounds Via Raman Phonon Spectroscopy: Another Spectral Probe of Crystal Structure," in International Conference Actinides 1989, Tashkent, USSR, Sept. 24-29, 1989, DOE/ER/13865-009.

G. D. Del Cul, G. M. Murray, G. M. Begun, and J. R. Peterson, "Raman, Fluorescence and Absorption Spectroscopic Studies of Selected Lanthanide Oxychlorides," 41st Southeast Regional Meeting, American Chemical Society, Wiston-Salem, North Carolina, Abstract 301, October 9-11, 1989.

G. D. DelCul "The Importance and Measurements of Waste Grout Physical Properties," in Material Research Society Symposium, Boston, November 1988.

Tallent,O.K., DelCul, G.D., McDaniel, E.W., Dodson, K.E., Trotter, D.R. "Immobilization of Technetium and Nitrate in Cement Based Materials," v. 112, pp. 23 32, Proc. Mater. Res. Soc. Symp., Boston, Nov.30 Dec.3,1988, Mater. Res. Soc., 1988.

G. D. DelCul, "Computer Applications to Leach Study Data," American Ceramic Society, Annual Meeting, Cincinnati, April-May 1988.

Computer Program for Use with ANSI/ANS 16.1 Standardized Leaching Procedure, G. D. Del Cul, K. Dodson, and O. K. Tallent, ORNL/TM 10789, 1988.

G. D. DelCul "Using Resins XAD-2 and XAD-4 for TBP Removal from Aqueous Solutions IAEA/NEA," International Symposium on the Back-End of the Nuclear Fuel Cycle, Vienna, Austria, May 1987.