BEFORE THE
ENVIRONMENTAL QUALITY COUNCIL
STATE OF WYOMING

IN THE MATTER OF THE OBJECTION)
TO THE PROPOSED RENEWAL PERMIT) Docket No. 11-5602
SAND DRAW LANDFILL, SHWD FILE #10-195)

PETITIONER, FREMONT COUNTY SOLID WASTE DISPOSAL DISTRICT'S SUPPLEMENTAL DESIGNATION OF EXPERT WITNESSES

COMES NOW Petitioner, Fremont County Solid Waste Disposal District (FCSWDD), by and through its undersigned counsel, and pursuant to the Council's Order of November 2, 2011, hereby submits its Expert Witness Designation in compliance with Rule 26, W.R.C.P., and names the following expert witnesses who may testify in this matter:

1. Ken Schreuder, P.E., P.G.
Trihydro Corporation
350 Garfield Street
Lander, Wyoming 82520
(307) 332-5280

Mr. Schreuder is a Professional Engineer (Wyoming #6213) and a Professional Geologist (Wyoming #49). He works for Trihydro Corporation in its Lander, Wyoming office. Trihydro Corporation is current contracted as the consulting engineer for the FCSWDD for the Sand Draw and Shoshoni landfill sites and is a former employee of the Wyoming Department of Environmental Quality, Solid and Hazardous Waste Division. Mr. Schreuder supervised, signed, dated and stamped the renewal permit application for the Sand Draw Landfill on behalf of the FCSWDD.

Mr. Schreuder will testify as to his education, training and experience and qualifications in the solid waste field, and also as to his work on the Sand Draw Landfill renewal permit

application. A copy of Mr. Schreuder's has previously been provided and is designated as Exhibit Sand draw 23.

Mr. Schreuder wil render his opinion that the DEQ has not provided the FCSWDD with an opportunity to respond to comments provided by the DEQ. This opinion is based upon the sequence of the reviews of the permit application, and the fact that the final review was significantly different than the first review and no period of comment or the opportunity to file an amended application were provided, other than the formal comment period after publication of the notice of the proposed permit.

Mr. Schreuder will render his opinion that he used monitoring data collected by Dr. Siegel to form his interpretations of the hydrogeologic conditions at the Sand Draw Landfill, and that the same did not require Dr. Siegel to be a Wyoming licensed geologist, as laboratory results are exempt from that requirement pursuant to W.S. 35-14-117(a)(xi).

Mr. Schreuder will render his opinion that disposal of waste in the original 80 acre area of the Sand Draw Landfill has not and is not adversely affecting the groundwater quality below the Sand Draw Landfill. His opinion is based upon the groundwater monitoring results that have been taken since the program was initiated in late 1999 and of which the DEQ has all the results. His opinion is further based upon the study conducted by Hydrogeophysics, Inc. which has been previously produced and is designated as Exhibit Sand draw 36, and the reports of Dr. Donald I. Siegel, which were previously produced and are designated as Exhibits Sand draw 25, 26 and 27. His opinion is further based upon the data contained in sections 4.4, 4.7, 4.8 and 5.5 of the renewal permit application and the tables, figures and appendices cited therein.

Mr. Schreuder will render his opinion that vertical expansion in the original 80 acre area of the Sand Draw Landfill as proposed in the permit renewal application has a very limited

potential for future adverse impacts on the groundwater quality below the Sand Draw Landfill. His opinion is based upon the results of the HELP model that was conducted, which is contained in the permit application and which DEQ has the results of, the Hydrogeophysics, Inc. study, which is produced herewith, and the reports that were conducted and produced by Dr. Siegel. His opinion is further based upon the data contained in sections 4.4, 4.7, 4.8 and 5.5 of the renewal permit application and the tables, figures and appendices cited therein

Mr. Schreuder will render his opinion as to the closure date of the original 80 acre area of the Sand Draw Landill (2037) being the maximum capacity for that area. His opinion is based upon the data contained in section 5.4 of the renewal permit application

Mr. Schreuder will render his opinion that disposal in the original 80 acre area until 2037 is necessary to obtain the necessary grade on the closure cap to prevent erosion and the pooling of surface water on the cap. His opinion is based upon the data contained in section 7.4 of the renewal permit application and the tables, figures and appendices cited therein.

Mr. Schreuder will render his opinion as to the groundwater quality and make-up of the groundwater underlying the Sand Draw Landfill. His opinion is based upon the data contained in Section 4.8 of the renewal permit application and the tables, figures, and appendices cited therein, and upon the chemical analysis that have been conducted on the groundwater and of which DEQ has copies of.

Mr. Schreuder will render his opinion that there are inconsistencies between regulatory approaches (ie., permitted operating lives) of the Lander and Sand Draw Landfills. His opinion is based on the data contained in Section 4.8 of the renewal permit application and the tables, figures and appendices cited therein, upon the chemical analysis that have been conducted on the groundwater at the Lander and Sand Draw Landfills, all of which the DEQ has copies of.

The FCSWDD will introduce the renewal permit application and all tables, figures and appendices thereto, Dr. Siegel's reports and the Hydrogeophysics, Inc. report and analysis on the groundwater monitoring system as exhibits as a summary of and in support of his opinions. The FCSWDD will also introduce: a table summarizing the volatile organic compounds detected to date by the groundwater monitoring program, a figure depicting a representation of the potentiometric surface, carbon-14 age data, and tritium data, a figure depicting the approximate extent of waste in 2018; and cross sections depicting the approximate extent of wastes in 2018.

In forming the above opinions Mr. Schreuder has relied upon the data specified above, and of the FCSWDD consultants (Inberg/Miller and Hydrogeophysics, Inc.) and the data they have formulated and submitted to the DEQ on periodic schedules and the data of Dr. Siegel. Mr, Schreuder also relies upon the following reports and documents:

1. October 15, 2010/Environmental Monitoring Report, Fremont County Solid Waste Disposal District, Sand Draw Landfill, SHWD #10.195, Monitoring Event: August 16 and 17, 2010/ Trihydro Corporation.

2. December 20, 2010/Environmental Monitoring Report, Fremont County Solid Waste Disposal District, Sand Draw Landfill, SHWD #10.195, Monitoring Event: November, 2010/ Trihydro Corporation.

3. December 23, 2010/ 2010 Renewal, Operating Permit Application, Sand Draw Landfill, Fremont County Solid Waste Disposal District/ Trihydro Corporation.

4. March 30, 2011/Environmental Monitoring Report, Fremont County Solid Waste Disposal District, Sand Draw Landfill, SHWD #10.195, Monitoring Event: February 2011/ Trihydro Corporation.

5. April 11, 2011/ Memorandum: Summary of Statutory and Regularoty Issues – Vertical

Expansion of the Sand Draw Landfill/ Trihydro Corporation.

6. June 30, 2011/Environmental Monitoring Report, Fremont County Solid Waste Disposal District, Sand Draw Landfill, SHWD #10.195, Monitoring Event: April and July 2011/ Trihydro Corporation.

7. July 18, 2011/ Sand Draw Landfill – Meeting Agenda (FCSWDD and DEQ)

8. September 13, 2011/ Environmental Monitoring Report, Fremont County Solid Waste Disposal District, Sand Draw Landfill, SHWD #10.195, Monitoring Event: April and July 2011/ Trihydro Corporation.

9. March 27-28, 2007/ Age Dating of Groundwater. Isotope methods of Groundwater Investigation Course: Groundwater Resources Association of California, Hilton Hotel, Concord, CA./ William E. Motzer.

10. December 11, 2008/ Analytical Summary Report, Work Order C08070774, Sanddraw/ Energy Laboratories Incorporated.

11. December 31, 2009/ Quarterly Environmental Monitoring Report, October 2009 Sampling Event, Sand Draw San#1 Landfill, WDEQ-SHWD #10.195/ Inberg-Miller Engineering.

12. March 19, 2010/ Quarterly Environmental Monitoring Report, First Quarter/ January 2010 Sampling Event, Sand Draw San#1 landfill, WDEQ-SHWD #10.195/ Inberg-Miller Engineer.

13. April 9, 2010/ Electronic Data Deliverable, Lander Landfill/ Lowham-Walsh Engineering.

14. June 6, 2011/ Response to May 23, 2011, Proposed Operating Permit and Major Amendment, Sand Draw landfill (SHWD File #10.195), Fremont County, Wyoming/ FCSWDD

correspondence to DEQ.

15. June 2011/ Tritium a Tool in Evaluating Groundwater Systems. WHP 1-109/ Michigan Department of Environmental Quality.

16. August 12, 2011/ Solid Waste Chapter 2 Operating Permit, Lander Landfill, SHWD File 10.195/ DEQ (application review and proposed permit).

Mr. Schreuder charges a fee of $127.00 per hour for the work he has performed and also for testifying in this matter.

Mr. Schreuder has not testified as an expert witness, either at trial or in deposition, within the last four (4) years.

2. Donald L. Sigel, Ph.D
Department of Earth Sciences
317 Heroy Geology Laboratory
Syracuse University
Syracuse, New York 13244
(315) 433-3607

Dr. Siegel is currently a Professor at Syracuse University. He has a Bachelor of Science in Geology, a Masters Degree in Geology and a Doctorate Degree in Hydrogeophysics. He has served as chairman of the Hydrogeological Division of the Geological Society of America, served on numerous National Research Council Committees, served on an international panel to provide advice to China regarding water contamination issues in that country, and has served as an expert witness to the United States Senate. He has also published numerous papers and books and acted as a consultant on various landfill issues. It is anticipated that Dr. Siegel will testify as to his education, training and experience and qualifications, and also as to his work on the Sand Draw Landfill. A copy of Dr. Siegel's resume has previously been produced to the DEQ and is designated as Exhibit Sand draw 24.

Dr. Siegel has produced 3 reports on the Sand Draw Landfill, and in particular on the issues of water contamination resulting from landfill activities. These are attached have been produced to the DEQ and are designated as Exhibits Sand draw 25, 26 and 27. Two (2) of the reports were submitted with the renewal permit application as Appendices V and Y and relied upon by Mr. Schreuder in preparation of the renewal permit application. In producing the reports and forming his opinions herein Dr. Siegel has relied upon appendix I, statistical analysis of groundwater by Dale Groutage, P.E., Exhibit Sand draw 28, the Potentiometric Surface map, Exhibit Sand draw 29, the Energy Laboratory groundwater sampling analysis results, Exhibit Sand draw 30, the Precision Laboratory groundwater analysis results, Exhibit Sand draw 31, the BETA Analytic, Inc. Carbon 14 and radiocarbon aging data, Exhibit Sand draw 32, the Sand draw sampling data results, Exhibit Sand draw 33, Sand draw well sampling data for various chemicals, Exhibit Sand draw 34, and the Hydrogeophysics, Inc. report and data previously produced to DEQ and is designated as Exhibit Sand draw 36.

Dr. Siegel will render his opinion that the hydrogeologic setting of the Sand Draw Landfill is such that the water levels in monitoring wells do not reflect a part of a regional water table within a continuous aquifer extending to the Wind River, but rather represent discontinuous distributions of water within pockets of sandy material interlayed mostly clayey silty sediments under the landfill site..

Dr. Sigel will render his opinion that the "potentiometric surface" defined by the FCSWDD former engineers for the Sand Draw Landfill (Inberg/Miller) and more recently by its current engineering firm (Trihydro, Inc.), reflect a perches water zone within clayey, silty rock, isolated from the deeper regional water table and compartmentalized internally with minimal flow from the highest hydraulic head to lowest.

Dr. Siegel will render his opinion that the original depositional setting of the rocks under the Sand Draw Landfill lead inherently to compartmentalization and no continuous water table except far below depths of the monitoring wells drilled at the site.

Dr. Siegel will render his opinion that the amount of precipitation on the Sand Draw Landfill site is insufficient to meaningfully percolate or infiltrate to the compartmentalized water-bearing zone.

Dr. Siegel will render his opinion that the tritium dates of water from monitoring wells indicated that the preponderance of rain that recharged the isolated pockets of water fell over 50 years ago, prior to per-atomic bomb testing. These results also show no meaningful modern recharge to the isolated water bearing zones.

Dr. Siegel will render his opinion that spatial variations in radiocarbon activity of the Sand draw landfill, and concentrations of major dissolved chemical species in the undeveloped area also document isolation of water in perched, discontinuous water-bearing zones.

Dr. Siegel will render his opinion that even if radiocarbon ages were corrected for "isotopic dilution" by chemical reactions in the aquifer, the radiocarbon dates in water from the water bearing zones would have been emplaced by precipitation recharge thousands of years ago.

Dr. Siegel will render his opinion that recharge does not reach the compartmentalized water-bearing zone. This opinion is based on the fact that the water levels measured in monitor wells do not change seasonally in a systematic manner. It is also based upon the data that the stable isotopic composition of the water sampled from the monitor wells is fundamentally different from the water that falls upon the landfill area and the area of Wyoming. This opinion is further based upon the Carbon-14 and tritium contents of dissolved inorganic carbons and water respectively sampled at the Sand Draw Landfill. The data used is the analysis of the

monitor well samples that are provided to the DEQ at periodic intervals.

Dr. Siegel will render his opinion that water does not move from wells where water levels are at high elevations to where they are at low elevations. This opinion is based upon the chemical composition from the monitor wells and their lack of consistency. The data relied upon are the chemical analysis from the monitor wells that are provided regularly to the DEQ.

Dr. Siegel will render his opinion that there is not a continuous water bearing zone under the Sand Draw Landfill. This opinion is based upon the geological exploration at the site that has been done by Hydrogeophysics, Inc. and Inberg/Miller.

Dr. Siegel will render his opinion that the vertical expansion in the original 80 acre area of the Sand Draw Landfill to the year 2037 as proposed in the Permit Application has not and is not altering the groundwater quality and there is very limited potential for the vertical expansion to adversely impact the groundwater quality.

Dr. Siegel will render his opinion that statistical analysis of total metals concentrations in ground water sampled from monitoring wells in clayey soils inherently can lead to false positives—"measured" concentrations of trace and other metals that do not occur in the groundwater moving in the subsurface.

Dr. Siegel will render his opinion that Trihydro's (2011) report showing statistical differences in iron and other trace metals between presumed upgradient and downgradient wells a the active Sand draw landfill, constitute such false positive.

Dr. Siegel will render his opinion that measurements of organic compounds less than 2 ppb and with J flag notation do not necessarily mean the compounds actually are present in the aquifer water.

In forming the above opinions Dr. Siegel has relied upon the data specified above, and of

the FCSWDD consultants (Inberg/Miller, Trihydro, Inc., and Hydrogeophysics, Inc.) and the data they have formulated and submitted to the DEQ on periodic schedules. Dr. Siegel also relies upon the following reports that he has provided to the FCSWDD:

1. Siegel, D.I. 2005, The Hydrogeologic Integrity of the Sand Draw Sand#1 Landfill, Fremont County, Wyoming.

2. Siegel, D.I. 2009, Compartmentalization of Ground Water at the Sand Draw #2 Landfill Site.

3. Siegel, D.I., 2010 addendum Letter Report: Compartmentalization of Ground water at the Sand Draw #2 Landfill site.

4. All resources sited in each of the above reports.

In forming the above opinions Dr. Siegel has visited the Landfill site, and principally relied upon the following consultant documents:

1. Fink, J.B., Rucker, D.F., Bell, R.S. and W.B. Isbell, 2009 High Resolution Resistivity Characterization of the Sand Draw Landfill, Fremont County, Wyoming, HydroGeophysics, Inc.

2. Hedges, J. and Groutage, D. (2005) Analysis of Well Monitoring Data for Wells R-7, R-8, R-10, & R-12 at Riverton Sand Draw Landfill And Wells LA-1, LA-11, & LA-12.

3. Inberg-Miller, 2008, 2008 Annual Environmental Monitoring Report Sand Draw #1 Landfill SHWD #10.195 Fremont County, Wyoming.

4. Inberg-Miller Engineers, 2005 Subsurface exploration and groundwater study Sand Draw #1 Landfill.

5. Inberg-Miller Engineers, 2009, Subsurface exploration Report Sand Draw #1 Landfill WDEQ-SHWD #10-195 Fremont County, Wyoming.

In forming the above opinions Dr. Siegel has also relied upon the following publications:

1. Bartos, T.T., Ogle, and K.M., 2002, Water quality and environme3ntal isotopic analysis of ground-water samples collected from the Wasatch and Fort Union Formations in areas of coalbed methane development: Implications to rechaarge and ground-water flow, eastern Powder River Basin, Wyoming, USGS Wri No. 2002-4045, 88 p.

2. Bauer, R.I., Siegel, D.I., Sandvol, E.A. and Lautz, L.K. (2009 Integrating hydrology and geophysics into a traditional geology field course: the use of advanced project options, in Whitmeyer, S.J., Mogk, D.W. an Pyle Eds, field Geology Education: Historical Perspectives and Modern Approaches, Geological Society of America Special Paper 461.

3. Benjamin, L., Knobel, L.L., Hall, L.F., Cecil, L.D., and Green, J.R., 2005 Development of a local meteoric water line for southeastern Idaho, Western Wyoming and Southcentral Montana: U.S. Geological Survey Scientific Investigations Report 2004-5126, 17p.

4. Bjere, P.I. and others, 2009, The Groundwater geochemistry of Waste Disposal Facilities, Treatise of Geochemistry, chapter. 9.16.

5. Clark, I., and P. Fritx, Environmental Isotopes in Hydrology, CRC Press, Boca Raton, Fl., 1997.

6. Coplen T.B. and Kendall C., 2000, Stable hydrogen and oxygen isotope ratios forselected sites of the U.S. Geological Survey's NASQAN and Benchmark suface-waternetworks. US Geological Survey Open-File Report 00-160: 424.

7. Hem, J.D., 1985, Study and Interpretation of he Chemical Characteristics of Natural Water, U.S. Geological Survey Water Supply Paper, 2254.

8. Hem, J.D., 1977, RFeactions of metal ions a surfaces of hydrous iron oxide, Geochimica Cosmochimica Acta, Vol 41, P. 527-538.

9. Jin, L. 2008 Evaluating spatial and temporal variations of water chemistry and the

impact of transient storage on solute transport in low-order mountain streams, PhD Dissertation, Syracuse University.

10. Scanlon, B.R., Tyler, S.W. and Wierenga, P.J./ 1997. Hydrologic issues in arid, unsaturated systems and implications for contaminants transport. Review of Geophysics. 35(4): 461-490.

11. Whitcomb, H.A. and Lowery, M.E., 1968, Ground-water resources and geology of the Wind River Basin area, central Wyoming, Hydrologic Investigations Atlas, 12p.

The FCSWDD will introduce the three reports prepared by Dr. Siegel as exhibits as a summary of and in support of his opinions.

Dr. Siegel charges a fee of $350.00 per hour for the work he has performed and also for testifying in this matter.

Dr. Siegel has not testified as an expert witness, either at trial or in deposition, within the last four (4) years.

3. James Fink, P.E. Ph.D., RG, RLS
   hydroGEOPHYSICS, Inc.
   2302 North Forbes Boulevard
   Tucson, AZ 85745
   (520) 647-3315

Dr. Fink is currently the founder and chief scientist in hydroGEOPHYSICS, Inc and an adjunct professor in the Dept of Mining and Geological Engineering at the University of Arizona in Tucson. A copy of his resume has been produced to the DEQ and is designated as Exhibit Sand Draw 35. In 2007 and 2008 the FCSWDD hired Hydrogeophysics, Inc. to perform a High Resolution Resistivity survey of the Sand Draw Landfill. The purpose of the survey was to obtain additional data to determine the geology and water conditions of the sub-terrain below the

Landfill. It is anticipated that Dr. Fink will testify as to his education, training and experience and qualifications, and also as to his, and his companies work on the Sand Draw Landfill renewal permit application.

Dr. Fink will render his opinion that the Sand Draw Landfill is underlain by massive, electrically conductive, clay-rich sediments containing multiple confined and unconfined water bodies in localized, slightly-higher-permeability sediments.

Dr. Fink will render his opinion that the regional aquifer is several hundred feet below the surface.

Dr. Fink will render his opinion that any perched water bodies likely occur in semi-permeable clastic lenses that are vertically constrained between thick claystone/siltstone units.

Dr. Fink will render his opinion that near surface water bodies are underlain by confining fine-grained, bentonite-rich, stratigraphic units.

Dr. Fink will render his opinion that the Sand Draw Landfill is naturally lined with clay material.

The data and information relied upon by Dr. Fink in forming the basis of his opinions consist of the results of the High Resolution Resistivity Survey conducted on the site by his company ,a copy of which was previously provided to the DEQ, and is designated as Exhibit Sand draw 36. He has also relied upon the data and information in the form of groundwater sample monitoring, groundwater sampling, as set forth above under the designation of Dr. Siegel. He has also relied upon the following references cited in his report, to-wit:

1. Rucker, D.F., and J.B. Fink, 2007, "Inorganic Plume Delineations using Surface High Resolution Electrical Resistivity at the BC Dribs and Trenches Site, Hanford, "Vadose Zone Journal 6(4):946-958.

2. Siegel, D.I., 2006, "The Hydrogeologic Integrity of the Sand Draw Landfill, Fremont County, Wyoming."

Dr. Fink has also relied upon the following reports and data in forming his opinions:

1. Keefer, William R., "Stratigraphy and Geologic History of the Uppermost Cretaceous, Palcocene, and Lower Eocene Rocks in the Wind River Basin, Wyoming" USGS Prof. Paper 495-A, SUPDOC, 1965.

2. Keefer, William R., Structural Geology of the Wind River Basin, Wyoming" USGS Prof. Paper 495-D, SUPDOC, 1970.

3. Hysrographs provided by IME for monitoring wells at Sand Draw Landfill.

4. Digital Elevation Model of Arapahoe NE 7.5 Min topo Quad.

5. Groutage, Dale and Hedges, Jim, "Appendix I Analysis of Well Monitoring Data for Wells R-7, R-8, R-10, and R-12 at Riverton Sand-Draw Landfill and Wells LA-1, LA-11, and LA-12 at Lander landfill", attachment to a letter to the DEQ, 15 April, 2005.

6. Butler, James J., "The Design, Performance, and Analysis of Slug Tests", CRC Press, LLC, 1998,

At the time hydroGEOPHYSIC performed their survey, Dr. Fink was President, Chief Technology Officer, and primary owner of hydroGEOPHYSICS. The company has since been sold to Columbia Energy and Engineering Services, Inc. (CEES). CEES charges a fee of $240.84 per hour for Dr. Fink's document preparation and testimony. Dr. Fink receives his current salary rate of $55.00 per hour for the work he has performed and also for testifying in this matter.

Dr. Fink has not testified as an expert witness, either at trial or in deposition, within the last four (4) years.

DATED this _____ day of November, 2011.

Fremont County Solid Waste
Disposal District, Petitioner

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Rick L. Sollars, WSB # 5-2394
Attorney for Petitioner
Western Law Associates, P.C.
277 Lincoln Street
Lander, WY 82520
(307) 332-4331

CERTIFICATE OF SERVICE

I certify that on the ____ day of November, 2011, a true and correct copy of the foregoing Petitioner's Supplemental Designation of Expert Witnesses was served upon Respondent and counsel by depositing the same in the United States mail, postage prepaid, addressed to:

Jeremiah I. Williamson
Luke J. Esch
Wyoming Attorney General's Office
132 Capitol Building
Cheyenne, WY 82002

_____

Rick L. Sollars