From: repar@saw.net
To: EFSEC mi Comments
Subject: Fwd: Comments on the current Public Participation Policy for the Whistling Ridge meeting
Date: Friday, September 15, 2023 5:47:34 PM
Attachments: WREP_appendix G_Response to comments list.pdf
WREP_DEIS_distro list.pdf
WREP_Final EIS_distro list_Aug2011.pdf
WREP_Repar_comments submitted in 2010.pdf

External Email

Dear EFSEC,
Yesterday, I sent in comments about the Whistling Ridge amendments requests, see email below. However, I noticed in today's corrected notice that there is a separate comments email so I am forwarding this email and the one below to comments@efsec.wa.gov , with additional comment(s).

The corrected notice makes it appear as if these two amendment requests are minor issues and will be adequately addressed in the Oct 9th EFSEC meeting. However, if there are substantive changes to the FEIS, such as the proponent putting in bigger wind mills, or placing any windmills in other areas, those would be a substantive changes and would definitely require a new EIS.

We are 12 years down the road on this project and there are safer, cleaner, and less environmentally damaging ways to produce energy. I urge EFSEC to post the applicant's documents that are from 2023 and not from 2022. And, if the applicant has made substantive changes or is even thinking about making substantive changes at the site, then those substantive changes need to put on the website, too, so the public and interested parties can make comments on them.

We all know what substantive means when we see it. Also, EFSEC needs to address Environmental Justice and what it means in the context of this project.

Thank you.

Mary Repar
P.O. Box 103
Stevenson, WA 98648

tel: (360) 726-7052

From: "Mary Repar" <repar@saw.net>
To: "lance caputo" <lance.caputo@efsec.wa.gov>
Cc: "efsec" <efsec@efsec.wa.gov>
Sent: Thursday, September 14, 2023 4:02:42 PM
Subject: Comments on the current Public Participation Policy for the Whistling Ridge meeting

Dear Lance and EFSEC,

First, I commented on the Whistling Ridge project at its inception and in 2010 and 2011. Since that time my residence address has changed, from 6971 E. Loop Rd., #2, Stevenson, WA 98648, to P.O. Box 103 Stevenson, WA 98648. My new cell number is (360) 726-7052. My

email is still repar@saw.net. Please use the current information for any notices about Whistling Ridge. Thank you.

I received the EFSEC notice that Whisting Ridge is up for discussion--again. Apparently, the two issues that are on the notice are the change in ownership and the request to extend the Site Certificate Agreement another three (3) years. The first notice that was sent and which I received yesterday, stated that the meeting was set for Sept 14th, which is today, even though in another part of the notice the meeting date was October 9th, 2023. Today's amended notice on the EFSEC website still says Sept 14 in the information paragraph. This is quite extraordinary, that EFSEC's notices can be so incorrect and could lead to a lot of misunderstandings and under-representation from the public which has a deep concern about this project. I have gone through my hardcopies of all the EIS info and have attached some of the distribution lists and the people and entities who made comments in 2010 and 2011, see attachments.

This info "Informational Public Meeting: Monday, October 9, 2023, 5 PM – 7 PM or last speaker whichever comes first: Pursuant to WAC 463-66-030, EFSEC proposes to hold a virtual, public, special meeting on the evening of September 14, 2023." is incorrect and is on the website. And, the time period, 5 - 7 PM is totally inadequate for such a contentious subject! Nowhere in the current version of the notice did I see a deadline for public comments to be received by EFSEC. Also, when I followed the hyperlink "Copies of the current Site Certification Agreement and the Certificate Holder's amendment request are available at:• https://www.efsec.wa.gov/energy-facilities/whistling-ridge-energy-project," in the notice, all I see is the March 24, 2022 request at https://www.efsec.wa.gov/sites/default/files/096000/02571/20220324_WR_TransferRequest.pdf, and signed by Greg Corbin, senior special counsel. Where are the requests from the NEW owners for an extension of the SCA and the request for transfer of ownership??

A transparent and accountable public participation process demands that the public have the most current and available data for their decision-making. That is not the case here--the date misinformation in both notices is striking. I've looked at the EFSEC website for the public participation policy and a search yielded no such available document.

The Whistling Ridge project was contentious from the start and continues to be contentious. The fact that it is 12 years since the FEIS tells me that this project is doomed--the FEIS is expired. The NEPA process states that and EIS expires: " (2) Environmental impact statements within **2 years** unless a senior agency official of the lead agency approves a longer period in writing and establishes a new time limit. Two years is measured from the date of the issuance of the notice of intent to the date a record of decision is signed." Although this is for NEPA, it is common sense. And, in the case of Whistling Ridge, the SEPA would have to be redone: "In addition, agencies adopting existing environmental documents must independently determine if they meet environmental review standards and a proposal's needs. To be adopted, previous SEPA documents are not required to meet an agency's own preparation procedures. **However, in all cases, agencies are required to issue new threshold determinations.** (my bold) They can use the following previous SEPA documents" at https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/Guide-for-lead-agencies/Revising-and-adopting-existing-documents

I will be making comments for the Oct 9th meeting but I really urge EFSEC to establish a new,

corrected notice for each of the amendments, the SCA and the amendment; EFSEC should publish a Public Participation Policy for these requests; EFSEC should post the most recent, correct documents, from EFSEC and the applicant, on its website about the requests--this is critical so that public knows exactly who is requesting the extension and change of ownership. Twelve years should not be extended to 15 years. (Perhaps EFSEC needs to establish a policy of when a project actually is dead and cannot be resurrected.)

A timeline and correct documentation are critical in any public participation process. Thank you.

Please feel free to contact me.

Mary Repar
P.O. Box 103
Stevenson, WA 98648

Cell: (360) 726-7052

Comment: *I am an advocate for the project. [LTR 318, CMT 47]*

Response: Comment acknowledged.

Comment: *I support the project and will submit written comments. [LTR 318, CMT 48]*

Response: Comment acknowledged.

Comment: *We support the project on the condition that it be reconfigured. We would like the seven southerly most A towers moved back into the project. [LTR 318, CMT 57]*

Response: Comment acknowledged.

Comment: *I would like to reiterate the request to a) extend the comment period and b) hold an additional public hearing. [LTR 318, CMT 65]*

Response: Comment acknowledged, the end date of the DEIS public comment period was extended from July 19th, 2010 to August 27, 2010 and public hearings were held on June 16th and 17th, 2010.

INDEX

BONNEVILLE POWER ADMINISTRATION
DOE/BP-4319 • August 2011

5.0 DISTRIBUTION LIST

5.1 FEDERAL AGENCIES

USDOC NOAA
National Marine Fisheries Service
Administration
525 N.E. Oregon St., Suite 500
Portland, Oregon 97232-2778

USDOC NOAA
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, Washington 98503-1291

USDOC NOAA
Northwest Power Planning Council
851 S.W. 6th Ave., Suite 1100
Portland, OR 97204-1348

U.S. Department of the Interior
Fish & Wildlife Service
P.O. Box 848
Ephrata, WA 98823-0848

U.S. Department of the Interior
Fish & Wildlife Service
911 N.E. 11th Avenue
Portland, OR 97232-4181

U.S. Department of the Interior
Fish and Wildlife Service
Hanford Reach National Monument/
Saddle Mountain National Wildlife Refuge
3250 Port of Benton Blvd.
Richland, WA 99352-1670

U.S. Department of the Interior
Fish and Wildlife Service
Arid Lands Wildlife Refuge
3250 Port of Benton Blvd.
Richland, WA 99352-1670

U.S. Department of the Interior
Bureau of Land Management
Spokane District Office
1103 N. Fancher Road
Spokane, WA 99212-1275

U.S. Department of the Interior
Bureau of Indian Affairs
Yakima Agency Land Operations P11
Environmental Coordinator
P.O. Box 632
Toppenish, Washington 98948-0632

U.S. Department of the Interior
Bureau of Reclamation
1917 Marsh Road
Yakima, WA 98901-2058

U.S. Army Corps of Engineers
P.O. Box 3755
Seattle, Washington 98124-3755

U.S. Department of Energy
Office of NEPA Compliance
1000 Independence Ave. S.W.
Washington, D.C. 20585-0001

U.S. Department of Energy
Richland Operations Office
825 Jadwin Ave.
Richland, WA 99352-3589

U.S. Department of Transportation
Federal Aviation Administration
2200 W. Washington Ave.
Yakima, WA 98903-1249

U.S. Environmental Protection Agency
1200 Pennsylvania Ave. N.W.
Washington, DC 20004-2403

U.S. Environmental Protection Agency
Region 10
1200 6th Ave.
Seattle, Washington 98101-3123

5.2 TRIBAL GOVERNMENTS

Confederated Tribes and Bands of
The Yakama Nation
Ms. Lavina Washines, Vice Chair
P.O. Box 151
Toppenish, WA 98948

Confederated Tribes and Bands of
The Yakama Nation
Wildlife Resource Management
P.O. Box 151
Toppenish, WA 98948

Confederated Tribes and Bands
Of the Yakama Nation
Mr. Harry Smiskin, Chairman
Tribal Council
P.O. Box 151
Toppenish, WA 98948

Confederated Tribes of the Umatilla
Indian Reservation
Ms. Teara Ferman
CRPP
46411 Timine Way
Pendelton, OR 97801

Confederated Tribes of the Umatilla
Indian Reservation
Ms. Catherine Dickson
CRPP Principal Investigator
46411 Timine Way
Pendleton, OR 97801

Nez Perce Tribe
Mr. Samuel Penney, Chairman
P.O. Box 365
Lapwai, ID 83540

Nez Perce Tribe
Mr. Josiah
P.O. Box 365
Lapwai, ID 83540

Confederated Tribes and Bands of
The Yakama Nation
Mr. Johnny Jackson, Cascade Chief
P.O. Box 190
Underwood, WA 98651

Confederated Tribes and Bands of
The Yakama Nation
Mr. Wilbur Slockish, Chief
P.O. Box 782
The Dalles, OR 97058

Confederated Tribes of the Umatilla
Indian Reservation
Mr. Elwood Patawa, Chairman
46411 Timine Way
Pendleton, OR 97801

Confederated Tribes of the Umatilla
Indian Reservation
Mr. Shawn Steinmetz
CRPP
46411 Timine Way
Pendleton, OR 97801

Confederated Tribes of the Umatilla
Indian Reservation
Ms. Carey Miller
CRPP
46411 Timine Way
Pendleton, OR 97801

Nez Perce Tribe
Ms. Vera Sonneck
P.O. Box 365
Lapwai, ID 83540

Confederated Tribes of the Warm Springs
Reservation of Oregon
Mr. Ronald Suppah, Chairman
P.O. Box C
Warm Springs, OR 97761

Ms. Sally Bird, Cultural Resources Manager
Warm Springs GeoVisions
P.O. Box 460
Warm Springs, OR 97761

Confederated Tribes of the Warm Springs Reservation of Oregon
Mr. Robert Brunoe, THPO
P.O. Box C
Warm Springs, OR 97761

Cowlitz Indian Tribe
Mr. William Iyall, Chairman
P.O. Box 2547
Longview, WA 98632

Cowlitz Indian Tribe
Mr. David Burlingame
P.O. Box 2547
Longview, WA 98632

Cowlitz Indian Tribe
Mr. John Barnett
P.O. Box 2547
Longview, WA 98632

5.3 PUBLIC OFFICIALS

State of Washington
Office of the Governor
Honorable Christine Gregoire, Governor
P.O. Box 40002
Olympia, WA 98504-0002

State of Washington
State Senate District 15
Honorable Jim Honeyford, Senator
P.O. Box 40415
Olympia, WA 98504-0415

State of Washington
House of Representatives
House District 15
Honorable Bruce Chandler, Representative
P.O. Box 40600
Olympia, WA 98504-0600

State of Washington
House of Representatives
House District 15
Honorable David Taylor, Representative
P.O. Box 40600
Olympia, WA 98504-0600

U.S. Senate
Honorable Patty Murray, Senator
Jackson Federal Bldg., Suite 2988
915 2nd Ave.
Seattle, WA 98174-1009

U.S. Senate
Honorable Maria Cantwell, Senator
915 2nd Ave., Suite 3206
Seattle, WA 98174-1011

U.S. House of Representatives
House District 3
Honorable Brian Baird, Representative
120 Union Avenue, Suite 105
Olympia, WA 98501

U.S. House of Representatives
House District 4
Honorable Richard Hastings, Representative
302 E. Chestnut Ave.
Yakima, WA 98901-2718

5.4 STATE AGENCIES

State of Washington
Office of Archaeology and Historic Preservation
420 Golf Club Road
Olympia, WA 98504-8343

State of Washington
Department of Ecology
SEPA Review Section
P.O. Box 47703
Olympia, WA 98504-7703

State of Washington Department of Ecology
15 West Yakima Avenue, Suite 200
Yakima, Washington 98902-3452

State of Washington
Department of Natural Resources
SEPA Center
P.O. Box 47015
Olympia, WA 98504-7015

State of Washington
Department of Fish and Wildlife
Anne Friez, Regional Habitat Program Manager
WDFW, Region 5
2108 Grand Blvd.
Vancouver, WA 98661

State of Washington
Department of Natural Resources
Washington Natural Heritage Program
P.O. Box 47016
111 Washington St. S.E.
Olympia, WA 98504-7016

State of Washington
Department of Transportation
1231 Scale House Rd
PO Box 125
Goldendale, WA 98620

State of Washington
Department of Transportation
Southwest Region
P.O. Box 1709
Vancouver, Washington 98682

5.5 LOCAL GOVERNMENTS AND UTILITIES

Skamania County Commissioner
Jim "JR" Richardson
PO Box 790
Stevenson, WA 98648

Skamania County Commissioner
Paul Pearce
PO Box 790
Stevenson, WA 98648

Skamania County Commissioner
Jamie Tolfree
PO Box 790
Stevenson, WA 98648

Skamania County Community Development Department
Karen Witherspoon, Director
PO Box 790
Stevenson, WA 98648

Skamania County Community Development Department
Mark Mazeski, Senior Planner
PO Box 790
Stevenson, WA 98648

Skamania County Public Works Department
Larry Douglass, Director
PO Box 790
Stevenson, WA 98648

Skamania County Noxious Weed Program
Todd Murray
PO Box 790
Stevenson, WA 98648

Southwest Clean Air Agency
11815 NE 99th Street
Suite 1294
Vancouver, WA 98682

Skamania County Public Utility District #1
1492 Wind River Highway
Carson, Washington 98610

5.6 LIBRARIES AND EDUCATIONAL INSTITUTIONS

Fort Vancouver Regional Library
120 NW Vancouver Avenue
P.O. Box 818
Stevenson, Washington 98648

White Salmon Community Library
5 Town & Country Square
White Salmon, Washington 98672

Cascade Locks Branch Library
140 SE Wa-Na-Pa Street
Cascade Locks, Oregon 97014

Hood River County Library
502 State Street
Hood River, Oregon 97031

State of Washington
Joel M. Pritchard Library MS 42460
415 15th St. S.W.
Olympia, WA 98504-0001

Yakima Valley Regional Library
Reference Coordinator
102 N. 3rd Street
Yakima, Washington 98901-2705

Washington State University
2710 University Drive
Richland, WA 99352-1671

Bonneville Power Administration Library
905 NE 11th Avenue, NHTL-1
Portland, Oregon 97232

5.7 MEDIA

Yakima Herald Republic
City Editor
P.O. Box 9668
Yakima, WA 98909-0668

KNDO TV
News Director
1608 S. 24th Ave.
Yakima, WA 98902-5719

KIMA TV
2801 Terrace Heights Dr.
Yakima, WA 98901-1455

KAPP TV
Applevalley Broadcasting Avenue 77
P.O. Box 10208
Yakima, WA 98909-1208

The Oregonian
803 State St, Hood River, OR 97031
(541) 386-3944

Hood River News
419 State St, Hood River, OR 97031
(541) 386-1234

Goldendale Sentinel
117 W Main St, Goldendale, WA 98620
(509) 773-3777

5.8 UTILITIES

Northwest Pipeline Company

5.9 INTERESTED GROUPS

Columbia Gorge Audubon Society

Friends of the Columbia Gorge

Gifford Pinchot Task Force

Kittitas Audubon

Northwestern Lake Development Homeowners' Association

Renewable Northwest Project

Save our Scenic Area (SOSA)

Salem Audubon Society

Seattle Audubon

Skamania County Agri-Tourism Association

Vancouver Audubon Society

5.10 INTERESTED INDIVIDUALS

Sallie T. Jones

Wilbur Slockish

Brian Logan

Johnny Jackson

Charly Boyd

Sonja Lane

Craig Ferguson

Kevin Herman

Don Morby

Jacob Anderson

Tim Killian

Charlie Guthrie

Gary Kahn

Kick Till

Nathan Baker

Shirley and John Tyler

Glenda and Matt Ryan

Jill Barker

Paul Smith

Teresa Robbins and Keith Brown

Cliff Jewell

Sally Newell

Ron Reynier

Ronda and John Crumpacker

W. S. Vinegard

Adriane Borejias

Robin Capra

Jan Aarts

Joanna Grammor

Karen and Larry Kessler

Kelley Beamh

Peter Caraylisen

Arlene and Don Bradford

Nathan Baker and Kelley Beamer

Keith Brown and Teresa Robbins

David Taylor

Rhys Harrihan

Mike Eastwide

Gary and Jill West

Martha Krawn

Steven Bronsveld

Wirt T. Maxey

6.0 LIST OF PREPARERS

The Whistling Ridge Energy Project EIS was prepared by the Washington Energy Facility Site Evaluation Council (EFSEC) and Bonneville Power Administration (BPA), with the assistance of URS Corporation (URS), a consulting firm, West Inc., Northwest Wildlife Consultants, GeoDataScape, and Carroz Consulting. In addition, ENTRIX Consulting was retained by Washington EFSEC to provide an independent, third-party review of the EIS for SEPA and NEPA compliance. The following lists those individuals who participated in the preparation of this EIS. Consultant disclosure statements required under NEPA (*see* 40 CFR 1506.5(c) and 10 CFR 1021.310) are included in Appendix F of this EIS.

6.1 WASHINGTON EFSEC

Al Wright, EFSEC Manager.

Stephen Posner, EFSEC Compliance Manager. Mr. Posner has over 25 years experience working in various environmental regulatory programs. As EFSEC's Compliance Manager for the last 3 years, Mr. Posner is responsible for managing environmental compliance activities for facilities under EFSEC's jurisdiction. Mr. Posner also coordinates and participates in the review of applications for site certification. Prior to working at EFSEC, Mr. Posner worked for the California Environmental Protection Agency as a hazardous waste/solid waste compliance inspector. Education: Bachelor's Degree in Biological Sciences.

Jim La Spina, EFSEC Compliance Specialist. Jim has been a state environmental regulator for almost 14 years. He wrote NPDES Permits for Ecology for 11 years and joined EFSEC in September 2007 as an Energy Facility Siting Specialist. Jim is responsible for coordinating the review of a project proponent's Application for Site Certification. After the governor approves a proposed project, Jim verifies the Certificate Holder's compliance with requirements in the Site Certification Agreement. Education: Masters in Environmental Studies.

6.2 BPA

Andrew M. Montaño, EIS Project Manager, Environmental Protection Specialist. Mr. Montaño has nearly 20 years experience within the environmental field. His primary background was in water quality-related research while working as an Aquatic Biologist with his former agency, the Bureau of Reclamation. Additionally, he has also specialized in toxicology and hazardous wastes site management, nuisance species control, and some fisheries-related activities. His NEPA experience includes projects that proposed modified flow regimes on regulated rivers in the western United States as well his recent experience with transmission-related projects. Education: MS in Environmental Science and Engineering; BS in General Studies (biology emphasis)

Amy Freel, Electrical Engineer. Mrs. Freel has 19 years of experience working at BPA of which she has been an electrical engineer for 14 years. She worked as a Substation Designer for 10 years, a Customer Service Engineer for 1 year, and as a Project Manager for the last 3 years. In her role as an electrical engineer, she designed and managed the installation of high voltage projects from the planning stage through the commissioning stage. Projects include new and up grades to substations and transmission lines 500kV and below. Education: BS, Electrical Engineering

Hub Adams, Attorney. Mr. Adams has 20 years of experience preparing environmental documents for compliance with NEPA, state "little NEPA" laws, and other environmental laws. As BPA's NEPA attorney, he is responsible for ensuring NEPA compliance for BPA's activities and assisting in the preparation of EISs and other NEPA documents. Prior to BPA, he worked as an environmental consultant managing and preparing joint NEPA/state EISs, other environmental documents, and project permitting processes for a variety of proposed projects, including complex energy, mining, and transportation projects. He is a member of the American Planning Association (APA) and the American Institute of Certified Planners (AICP). Education: JD, Certificate in Environmental and Natural Resources Law; BA, Urban and Regional Planning.

6.3 CONSULTANTS

6.3.1 URS

Katy Chaney, Project Manager. Ms. Chaney has over 27 years of experience. As vice president and manager of URS's Pacific Northwest environmental services, her management responsibilities include environmental impact statements, permitting efforts, and planning and siting studies. Education: BA, Political Science.

Dale Bennett, JD, Senior Planner. Mr. Bennett has 20 years of experience managing large and small planning, land use, regulatory, and remote sensing projects.

Mark DuLaney, Senior Graphics Illustrator. Mr. DuLaney has over 30 years of experience in graphic illustration and design. He has experience using Corel Draw and Corel Photo Paint, PageMaker, and Power Point. Education: Air Force 223X1 course in Technical Illustration and drawing classes at The New School of Visual Concepts.

David Every, PhD, Senior Ecologist. Dr. Every has over 30 years of experience as an environmental consultant on wetland and terrestrial ecological issues throughout the United States. Education: PhD, Botany; MS, Botany; BS, Zoology.

Mike Kelly, Senior Archaeologist. Mr. Kelly has 27 years of experience in cultural resource management and has been responsible for directing numerous archaeological investigations throughout the Pacific Northwest, California, and the Great Basin. Education: MA, Anthropology; BA, Anthropology.

Louise Kling, Ecologist and Environmental Planner. Ms. Kling has over 15 years of experience in fisheries and wildlife research, with an emphasis on disturbance ecology. She is well versed in survey methods used to quantify a variety of taxa, including terrestrial and aquatic habitat. She has implemented and managed projects for public agency, university, and private sector clients. Her analytical skills include a wide range of multivariate statistical methods and spatial analysis using GIS. For the past three years, she has focused on visual resource assessment and ecological design, land use evaluation, and environmental justice in support of the NEPA process. Her experience in visual resources assessment includes BLM, USFS, FHWA, and US Army Corps of Engineers methodologies and management of georeferenced photosimulation production. Her expertise has been applied to energy facilities siting, energy transmission, pipeline and transportation projects. In addition, she currently serves as a visual resources technical advisor to the Columbia River Gorge Vital Signs Indicator Project.

Sarah McDaniel, RPA, Staff Archeologist. Ms. McDaniel provides technical support for URS Corporation's cultural resources program in the Pacific Northwest Region and California. Responsibilities include archaeological site identification, recordation, and evaluation; historic resource documentation; and preparation of summary reports for compliance with federal and state regulations. Ms. McDaniel has six years of experience in cultural resources management and archaeological investigations.

Dan Meier, Engineering Geologist. Mr. Meier is a Certified Engineering Geologist located in Portland, Oregon. He has over 17 years of professional geologic experience in the western United States. His specialties include on-site geologic mapping, subsurface exploration, as-constructed geologic mapping, construction inspection, interpretation of field data, and preparation of maps and reports. He is experienced in seismic hazard evaluations, landslide evaluations, engineering geology and construction management and inspection.

Dautis Pearson, Environmental Planner. Mr. Pearson is a Senior Planner, NEPA, Endangered Species Act, and Federal/State agency and private compliance specialist. He has 23 years of experience in land management planning; interdisciplinary and interagency team leading and facilitation, and NEPA/SEPA environmental preparation. Dautis' experience with all federal agencies' NEPA and Endangered Species Act process provides great insight into various agency directions for collaboration and streamlining. He has 12 years of experience with USFS as a Land Use Planning Specialist and has supported or managed several energy and transmission related or linear projects. Education: BS, Biology; Riparian and Fire Ecology; Forestry; Silviculture.

Mark Storm, Senior Noise Control Engineer. Mr. Storm has over 18 years of experience managing tasks for environmental noise regulation review, field surveys, acoustical impact assessment, mitigation planning and compliance evaluation for various energy project types such as solar-to-thermal, wind turbine, biomass and natural gas. He is INCE board certified.

Jeff Walker, Botanist and Wetland Biologist. Mr. Walker has over 10 years of experience as a botanist. He has conducted vascular and nonvascular plant surveys, performed monitoring of rare plant populations, and conducted wetland delineations and evaluations. Education: BS, Botany and Environmental Studies.

6.3.2 WEST

Kimberly Bay. Ms. Bay has 9 years of experience working primarily on the coordination of the data and reports for wind-energy projects. This task includes data and database management, data quality assurance/quality control, data analysis, and finally compiling the results for the reports. She has experience with most statistical computer packages including SAS, R, SPLUS, and SPSS, the database application ACCESS, and the GIS application ARCVIEW.

Greg Johnson. Mr. Johnson has over 22 years of consulting experience in wildlife and ecological studies. He is a Certified Wildlife Biologist through The Wildlife Society, a Professional Wetland Scientist through the Society of Wetland Scientists, and a certified Senior Ecologist through the Ecological Society of America. His specialty areas include wildlife research with an emphasis on contaminants and wind power development; endangered species; wetland delineation, mitigation, and functional value assessment; and vegetation sampling. He has supervised 17 field studies to assess effects on terrestrial and aquatic wildlife of pesticides

and other contaminants throughout the US. Over the last 14 years, he has studied wildlife-windpower interactions at proposed or existing wind energy facilities in 16 US states and Alberta, Canada, and is currently Project Manager for the first large-scale greater sage-grouse telemetry study to evaluate impacts of wind energy development on this species.

Tamara Enz, Research Biologist. Tamara Enz is a project manager and biologist for WEST. After becoming fluent in Japanese, Tamara learned the more challenging language of botanical terms, earning a Master's of Science in plant biology at the University of Massachusetts, Amherst. Working throughout New England, Puerto Rico, and Montana, Tamara conducted community and wetland delineations and habitat suitability studies, coordinated rare plant searches, and participated in numerous research projects ranging from genetics studies to weed control. She has also done extensive bird work, including breeding and migratory bird surveys and point counts, banding, and call playback response surveys in New England, Alaska, Montana, and Canada. Her mammalian experience includes an ice based bowhead whale census in Barrow, Alaska, lynx tracking surveys in Wyoming, and general track surveys in Maine.

Jeffrey Gruver, Research Biologist. Jeff Gruver joined WEST in 2007. Jeff has been involved in bat research since 1996, and has studied bat ecology in the Pacific Northwest, the Rocky Mountains, and the Badlands of southern Alberta. He earned a B.S. in Economics (1993) from Penn State University and an M.S. in Zoology and Physiology from the University of Wyoming (2002). Jeff's M.S. research examined the assemblage of bats near a wind power facility in southern Wyoming in relation to documented bat fatalities at the facility. His PhD research focused on the how physiological constraints influence ecological responses of bats in northern arid climates. Jeff has authored or co-authored scientific publications on topics ranging from species conservation assessments to factors influencing bat fatality risks at wind energy installations.

6.3.3 NORTHWEST WILDLIFE CONSULTANTS

Scott Downes, Bob Gritski, and Karen Kronner. Northwest Wildlife Consultants, Inc. is an environmental consulting firm based in eastern Oregon and Washington. They specialize in wind energy studies and bird, reptile, amphibian and mammal surveys. They are partnering with the WDFW and Oregon Department of Fish and Wildlife on ferruginous hawk telemetry studies in the Columbia Basin.

6.3.4 GEODATASCAPE

Chris Watson. Mr. Watson, owner of GeoDataScape, has over ten years of experience in providing GIS and visual simulation experience for a variety of projects. He has worked as a field geologist. Education: MS and BS, Geology.

6.3.5 TURNSTONE ENVIRONMENTAL

Jeff Reams, Wildlife Biologist. Mr. Reams is also a partner with Turnstone Environmental Consultants, Inc. for 14 years. He is the senior wildlife biologist and oversees the northern spotted owl, northern goshawk and western gray squirrel surveys. Education: BS Oregon State University

Devin Sahl, Wildlife Biologist. Mr. Sahl has been employed by Turnstone Environmental Consultants Inc. for past 8 years. He served as a wildlife biologist and as the field coordinator on the Whistling Ridge project. He was involved with the northern spotted owl, northern goshawk and the western gray squirrel survey efforts associated with the project.

6.3.6 CARROZ CONSULTING

Katie Carroz, Socioeconomist. Ms. Carroz has 10 years of environmental analysis experience specializing in economic, socioeconomic, environmental justice, demographic, and fiscal analyses, and EIS preparation and coordination. Education: MA, Economics with an emphasis on natural resources; BA, Economics with minor in environmental studies.

6.3.7 ENTRIX

Jeremy Pratt, Project Manager. Jeremy Pratt leads the ENTRIX Western Division Environmental Management, Permitting and Compliance practice. Jeremy has more than 30 years' experience preparing environmental documents for compliance with NEPA, and throughout his career he has focused on managing large-scale, controversial projects to resolve long-standing resource conflicts in complex regulatory environments. Jeremy works with project applicants and local stakeholders concerned with the development, use, protection or environmental management of their sites, communities, or resources. He works easily in both the technical and policy areas to evaluate the environmental effects of proposed actions, programs, or projects; achieve permits and assure regulatory compliance; or develop management plans. Education: BS Interdisciplinary Studies, Evergreen State College; MS Environmental and Energy Sciences, Washington State University.

Jan Aarts, Deputy Project Manager. Jan Aarts has been preparing technically sound and legally defensible environmental documents and permit applications for a wide variety of transportation infrastructure projects for over 25 years. Mr. Aarts has prepared a number of environmental guidance documents, including an annotated report template and instruction handbook for authors and reviewers of NEPA Environmental Assessments for the Utah Department of Transportation, as well as the full range of Washington State Environmental Policy Act (SEPA) environmental documents, including Environmental Checklists and Environmental Impact Statements. Mr. Aarts has extensive experience preparing technically sound and legally defensible Federal Energy Regulatory Commission (FERC) license applications and National Environmental Policy Act (NEPA) environmental documents for a wide variety of energy projects in the western United States. Projects have included FERC license applications for several hydroelectric projects, environmental impact statements for natural gas and crude oil pipelines, wind energy projects, transmission lines, and substations. Education: MA Urban Planning, University of Washington; BA Urban Planning, University of Washington.

Ryan Shatt, Geologist. Mr. Shatt has over twelve years of experience as a geologist. His expertise includes Remedial Investigations, Human Health Risk Assessments, and Remedial Action. He conducts and manages environmental field investigations including supervision of subsurface drilling operations, monitoring well installation, lithologic identification, soil classification and interpretation, rock coring, borehole geophysics, and sampling of soil and ground water. He also assesses soil and ground water analytical data to evaluate compliance

with applicable regulations, conducts pump test analysis and groundwater flow evaluations, performs Phase I ESAs, prepares NEPA environmental documents and manages projects. He has experience as contributing author for soil, geology, and water resources sections for numerous EIS and EA reports. Education: BA Geosciences, Penn State University.

Eliza Ghitis, Geomorphologist. Eliza Ghitis has a background in coastal, estuarine and fluvial geomorphology, specializing in the ways physical systems interact with ecology. She has managed numerous salmon habitat restoration projects through all phases of design, permitting, implementation, and post-construction monitoring and maintenance. She has conducted ecological and geomorphic studies, including study design, data collection, data analysis and compilation of reports, and preparation of numerous NEPA environmental documents and NEPA technical supporting documents. She is trained in environmental hazard assessment and mitigation, including slope stability, water quality, and relative sea level rise. Education: MS Environmental Geomorphology, Oxford University; BS Earth and Space Sciences, University of Washington.

Sandra Slayton, Environmental Scientist. Ms. Slayton has nine years of experience in environmental science consulting specializing in watershed planning, GIS, water quality, floodplain management, and environmental policy. Ms. Slayton has experience preparing federal and state environmental documentation for linear and other energy projects. She has been involved in numerous watershed planning projects including work related to water quality analysis, habitat conservation and enhancement, and hydrologic and hydraulics studies. She is a member of the American Water Resources Association. Education: MA, Ecology, University of North Carolina at Chapel Hill; BA, Environmental Science, University of Virginia.

Lucy Zuccotti, Archaeologist. Ms. Zuccotti has over 12 years of technical and professional experience as an Archaeologist and Osteologist. Her background includes directing multiple field investigations in Western Washington and conducting background investigations in preparation for fieldwork. She has extensive experience writing reports summarizing research and field results in compliance with federal and state laws and regulations including NEPA and SEPA. Ms. Zuccotti has worked directly with and for Native American governments to mitigate impacts on tribal areas of interest. She is considered an expert in identification and analysis of human remains. Education: MA Anthropology, University of Arkansas; BA Anthropology, Hampshire College.

Dave Harvey, Historian. Mr. Harvey has over 30 years of experience in historic preservation, cultural resources management, architectural history, and historic research in the Pacific Northwest, California, Alaska, and Montana, and has assisted federal and state agencies, local governments and utilities, and private architectural and engineering firms in carrying out their cultural resources obligations under sections 106 and 110 of the National Historic Preservation Act (NHPA) and NEPA (EA/EIS). Mr. Harvey has worked closely with federal land management agencies, such as the U. S. Forest Service, National Park Service, Bureau of Reclamation, Bureau of Land Management, and U. S. Army Corps of Engineers throughout the Pacific Northwest and Alaska, where he conducted determination of National Register eligibility studies, Historic American Building Survey/Historic American Engineering Record (HABS/HAER) documentations, assessments of agricultural/early settlement landscapes, and historic land use studies. Education: MA History/Historic Preservation, Western Washington University; BA History and Government, Fairleigh Dickinson University.

Kirk Ranzetta, Cultural Resource Specialist. Dr. Ranzetta has over fourteen years of private, public, and non-profit sector work experience in cultural resource management, historic preservation, and environmental permitting including NEPA and state environmental policy laws. He has extensive experience in the Pacific Northwest, Midwest, and Mid-Atlantic regions managing, technically reviewing, and completing cultural resource surveys for compliance with Section 106 of the NHPA and NEPA (EA/EIS). He has also served as a technical editor, drafted text, and conducted fieldwork for cultural resource reports and other NHPA and NEPA related-documents. Prior to working at ENTRIX, Dr. Ranzetta served as the Review and Compliance Coordinator for the Oregon SHPO where he consulted with federal agencies on hundreds of projects, evaluated cultural resource reports for technical sufficiency, assisted agencies in the negotiation and preparation of MOAs, and worked to streamline project reviews. This experience included working closely with cultural resources staff from the Oregon DOT, Oregon Energy Siting Council, USFS, FERC, BPA, USFWS, BIA and BLM in Oregon. These reviews were conducted in compliance with Section 106 of the NHPA, Section 4(f), NEPA, HABS/HAER requirements, ORS 358.653, and OAR Chapter 345. Education: PhD Urban Affairs and Public Policy, University of Delaware; MA Urban Affairs and Public Policy, University of Delaware; BA Historic Preservation, University of Mary Washington.

Chelsea Ayala, Air Quality Specialist. Ms. Ayala has over 17 years of regulatory agency, analytical laboratory, and environmental consulting experience. She has served as project manager, deputy project manager, senior reviewer, technical writer, and technical lead for environmental projects throughout California and the United States. Her areas of expertise include air quality, noise, and climate change for a variety of projects, including oil and gas pipelines, electric transmission lines, and water projects. She has experience preparing environmental documentation for Projects involving NEPA and state environmental policy laws and has managed multiple projects for electric transmission lines and prepared environmental analyses for multiple oil and gas projects. Education: BA Environmental Studies, California State University.

Gretchen Lebednik, Biologist. Ms. Lebednik has managed numerous restoration, monitoring, and permitting projects. Ms. Lebednik has served as principal biologist or principal botanist in the preparation and review of Biological Assessments/Evaluations, FERC documents, NEPA/CEQA documents, California Energy Commission applications, and mitigation plans for projects in a variety of habitats in California and the Pacific Northwest. She has extensive training and field experience in plant ecology and taxonomy on the Pacific Coast and has performed numerous field investigations in freshwater seasonal wetland, vernal pool, riparian, estuarine, alkali meadow, coastal dune, desert, grassland, foothill woodland, and montane communities in California. Ms. Lebednik has served as principal biologist or principal botanist in the preparation and review of Biological Assessments/Evaluations, FERC documents, NEPA/CEQA documents, California Energy Commission applications, and mitigation plans for projects in a variety of habitats in California and the Pacific Northwest. Education: MS Botany, University of Washington, BA Environmental Biology, University of California.

5.0 DISTRIBUTION LIST

5.1 FEDERAL AGENCIES

USDOC NOAA
National Marine Fisheries Service
Administration
525 N.E. Oregon St., Suite 500
Portland, Oregon 97232-2778

USDOC NOAA
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, Washington 98503-1291

USDOC NOAA
Northwest Power Planning Council
851 S.W. 6th Ave., Suite 1100
Portland, OR 97204-1348

U.S. Department of the Interior
Fish & Wildlife Service
P.O. Box 848
Ephrata, WA 98823-0848

U.S. Department of the Interior
Fish & Wildlife Service
911 N.E. 11th Avenue
Portland, OR 97232-4181

U.S. Department of the Interior
Fish and Wildlife Service
Hanford Reach National Monument/
Saddle Mountain National Wildlife Refuge
3250 Port of Benton Blvd.
Richland, WA 99352-1670

U.S. Department of the Interior
Fish and Wildlife Service
Arid Lands Wildlife Refuge
3250 Port of Benton Blvd.
Richland, WA 99352-1670

U.S. Department of the Interior
Bureau of Land Management
Spokane District Office
1103 N. Fancher Road
Spokane, WA 99212-1275

U.S. Department of the Interior
Bureau of Indian Affairs
Yakima Agency Land Operations P11
Environmental Coordinator
P.O. Box 632
Toppenish, Washington 98948-0632

U.S. Department of the Interior
Bureau of Reclamation
1917 Marsh Road
Yakima, WA 98901-2058

U.S. Army Corps of Engineers
P.O. Box 3755
Seattle, Washington 98124-3755

U.S. Department of Energy
Office of NEPA Compliance
1000 Independence Ave. S.W.
Washington, D.C. 20585-0001

U.S. Department of Energy
Richland Operations Office
825 Jadwin Ave.
Richland, WA 99352-3589

U.S. Department of Transportation
Federal Aviation Administration
2200 W. Washington Ave.
Yakima, WA 98903-1249

U.S. Environmental Protection Agency
1200 Pennsylvania Ave. N.W.
Washington, DC 20004-2403

U.S. Environmental Protection Agency
Region 10
1200 6th Ave.
Seattle, Washington 98101-3123

Dan Wiley, Chief of Resources Stewardship
Lewis and Clark National Historic Trail
National Park Service
601 Riverfront Drive
Omaha, NE, 68102

Lee Kreutzer
National Trails System
National Park Service
324 S. State, Suite 200
Salt Lake City, UT, 84111

5.2 TRIBAL GOVERNMENTS

Confederated Tribes and Bands of
The Yakama Nation
Ms. Lavina Washines, Vice Chair
P.O. Box 151
Toppenish, WA 98948

Confederated Tribes and Bands of
The Yakama Nation
Mr. Johnny Jackson, Cascade Chief
P.O. Box 190
Underwood, WA 98651

Confederated Tribes and Bands of
The Yakama Nation
Wildlife Resource Management
P.O. Box 151
Toppenish, WA 98948

Confederated Tribes and Bands of
The Yakama Nation
Mr. Wilbur Slockish, Chief
P.O. Box 782
The Dalles, OR 97058

Confederated Tribes and Bands
Of the Yakama Nation
Mr. Harry Smiskin, Chairman
Tribal Council
P.O. Box 151
Toppenish, WA 98948

Confederated Tribes of the Umatilla
Indian Reservation
Mr. Elwood Patawa, Chairman
46411 Timine Way
Pendleton, OR 97801

Confederated Tribes of the Umatilla
Indian Reservation
Ms. Teara Ferman
CRPP
46411 Timine Way
Pendelton, OR 97801

Confederated Tribes of the Umatilla
Indian Reservation
Mr. Shawn Steinmetz
CRPP
46411 Timine Way
Pendleton, OR 97801

Confederated Tribes of the Umatilla
Indian Reservation
Ms. Catherine Dickson
CRPP Principal Investigator
46411 Timine Way
Pendleton, OR 97801

Confederated Tribes of the Umatilla
Indian Reservation
Ms. Carey Miller
CRPP
46411 Timine Way
Pendleton, OR 97801

Nez Perce Tribe
Mr. Samuel Penney, Chairman
P.O. Box 365
Lapwai, ID 83540

Nez Perce Tribe
Ms. Vera Sonneck
P.O. Box 365
Lapwai, ID 83540

Nez Perce Tribe
Mr. Josiah
P.O. Box 365
Lapwai, ID 83540

Confederated Tribes of the Warm Springs Reservation of Oregon
Mr. Ronald Suppah, Chairman
P.O. Box C
Warm Springs, OR 97761

Ms. Sally Bird, Cultural Resources Manager
Warm Springs GeoVisions
P.O. Box 460
Warm Springs, OR 97761

Confederated Tribes of the Warm Springs Reservation of Oregon
Mr. Robert Brunoe, THPO
P.O. Box C
Warm Springs, OR 97761

Cowlitz Indian Tribe
Mr. William Iyall, Chairman
P.O. Box 2547
Longview, WA 98632

Cowlitz Indian Tribe
Mr. David Burlingame
P.O. Box 2547
Longview, WA 98632

Cowlitz Indian Tribe
Mr. John Barnett
P.O. Box 2547
Longview, WA 98632

5.3 PUBLIC OFFICIALS

State of Washington
Office of the Governor
Honorable Christine Gregoire, Governor
P.O. Box 40002
Olympia, WA 98504-0002

State of Washington
State Senate District 15
Honorable Jim Honeyford, Senator
P.O. Box 40415
Olympia, WA 98504-0415

State of Washington
House of Representatives
House District 15
Honorable Bruce Chandler, Representative
P.O. Box 40600
Olympia, WA 98504-0600

State of Washington
House of Representatives
House District 15
Honorable David Taylor, Representative
P.O. Box 40600
Olympia, WA 98504-0600

U.S. Senate
Honorable Patty Murray, Senator
Jackson Federal Bldg., Suite 2988
915 2nd Ave.
Seattle, WA 98174-1009

U.S. Senate
Honorable Maria Cantwell, Senator
915 2nd Ave., Suite 3206
Seattle, WA 98174-1011

U.S. House of Representatives
House District 3
Honorable Brian Baird, Representative
120 Union Avenue, Suite 105
Olympia, WA 98501

U.S. House of Representatives
House District 4
Honorable Richard Hastings, Representative
302 E. Chestnut Ave.
Yakima, WA 98901-2718

5.4 STATE AGENCIES

State of Washington
Office of Archaeology and Historic Preservation
420 Golf Club Road
Olympia, WA 98504-8343

State of Washington
Department of Ecology
SEPA Review Section
P.O. Box 47703
Olympia, WA 98504-7703

State of Washington Department of Ecology
15 West Yakima Avenue, Suite 200
Yakima, Washington 98902-3452

State of Washington
Department of Natural Resources
SEPA Center
P.O. Box 47015
Olympia, WA 98504-7015

State of Washington
Department of Fish and Wildlife
Anne Friez, Regional Habitat Program Manager
WDFW, Region 5
2108 Grand Blvd.
Vancouver, WA 98661

State of Washington
Department of Natural Resources
Washington Natural Heritage Program
P.O. Box 47016
111 Washington St. S.E.
Olympia, WA 98504-7016

State of Washington
Department of Transportation
1231 Scale House Rd
PO Box 125
Goldendale, WA 98620

State of Washington
Department of Transportation
Southwest Region
P.O. Box 1709
Vancouver, Washington 98682

5.5 LOCAL GOVERNMENTS AND UTILITIES

Skamania County Commissioner
Jim "JR" Richardson
PO Box 790
Stevenson, WA 98648

Skamania County Commissioner
Paul Pearce
PO Box 790
Stevenson, WA 98648

Skamania County Commissioner
Bob Anderson
PO Box 790
Stevenson, WA 98648

Skamania County Community Development Department
Karen Witherspoon, Director
PO Box 790
Stevenson, WA 98648

Skamania County Community Development Department
Mark Mazeski, Senior Planner
PO Box 790
Stevenson, WA 98648

Skamania County Public Works Department
Larry Douglass, Director
PO Box 790
Stevenson, WA 98648

Skamania County Noxious Weed Program
Todd Murray
PO Box 790
Stevenson, WA 98648

Southwest Clean Air Agency
11815 NE 99th Street
Suite 1294
Vancouver, WA 98682

Skamania County Public Utility District #1
1492 Wind River Highway
Carson, Washington 98610

5.6 LIBRARIES AND EDUCATIONAL INSTITUTIONS

Fort Vancouver Regional Library
120 NW Vancouver Avenue
P.O. Box 818
Stevenson, Washington 98648

White Salmon Community Library
5 Town & Country Square
White Salmon, Washington 98672

Cascade Locks Branch Library
140 SE Wa-Na-Pa Street
Cascade Locks, Oregon 97014

Hood River County Library
502 State Street
Hood River, Oregon 97031

State of Washington
Joel M. Pritchard Library MS 42460
415 15th St. S.W.
Olympia, WA 98504-0001

Yakima Valley Regional Library
Reference Coordinator
102 N. 3rd Street
Yakima, Washington 98901-2705

Washington State University
2710 University Drive
Richland, WA 99352-1671

Bonneville Power Administration Library
905 NE 11th Avenue, NHTL-1
Portland, Oregon 97232

5.7 MEDIA

Yakima Herald Republic
City Editor
P.O. Box 9668
Yakima, WA 98909-0668

KNDO TV
News Director
1608 S. 24th Ave.
Yakima, WA 98902-5719

KIMA TV
2801 Terrace Heights Dr.
Yakima, WA 98901-1455

KAPP TV
Applevalley Broadcasting Avenue 77
P.O. Box 10208
Yakima, WA 98909-1208

The Oregonian
803 State St, Hood River, OR 97031
(541) 386-3944

Hood River News
419 State St, Hood River, OR 97031
(541) 386-1234

Goldendale Sentinel
117 W Main St, Goldendale, WA 98620
(509) 773-3777

Skamania County Pioneer
P.O. 219
Stevenson, WA 98648

5.8 UTILITIES

Northwest Pipeline Company

5.9 INTERESTED GROUPS

Columbia Gorge Audubon Society

Friends of the Columbia Gorge

Gifford Pinchot Task Force

Kittitas Audubon

Northwestern Lake Development Homeowners' Association

Renewable Northwest Project

Save our Scenic Area (SOSA)

Salem Audubon Society

Seattle Audubon

Skamania County Agri-Tourism Association

Vancouver Audubon Society

5.10 INTERESTED INDIVIDUALS

Sally Newell

Gretchen Starke

Mary Repar

Robert Graham

Carol Taylor

Dawn Stover

Tom Rousseau

Rick Aramburu

Gary Kahn

Jessica Walz

Sallie Jones

Nathan Baker

Peter Cornelison

Ron Reynier

Rick Till

Keith Brown and Teresa Robbins

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6.0 LIST OF PREPARERS

The Whistling Ridge Energy Project EIS was prepared by the Washington Energy Facility Site Evaluation Council (EFSEC) and Bonneville Power Administration (BPA), with the assistance of URS Corporation (URS), a consulting firm, West Inc., Northwest Wildlife Consultants, GeoDataScape, and Carroz Consulting. In addition, ENTRIX Consulting was retained by Washington EFSEC to provide an independent, third-party review of the EIS for SEPA and NEPA compliance. The following lists those individuals who participated in the preparation of this EIS. Consultant disclosure statements required under NEPA (*see* 40 CFR 1506.5(c) and 10 CFR 1021.310) are included in Appendix F of this EIS.

6.1 WASHINGTON EFSEC

Al Wright, EFSEC Manager. Mr. Wright has over 40 years experience in the energy and environmental fields. Mr. Wright has been Managing Director of EFSEC since 2010 and is responsible for all facets of EFSEC activities. Before joining EFSEC Mr. Wright was consultant to NW Utilities on hydro-electric operations and power sales contracts. Mr. Wright has also served as Executive Director of the Pacific Northwest Utilities Conference Committee, a NW association of public and private electric utilities. He also served a director of the Oregon Water Resources Board and as the Regional Coordinator for the Mid-Columbia Public Utilities Districts. Mr. Wright holds a Civil Engineering degree from University of California at Berkeley and has completed graduate studies in Watershed Management from Humboldt State College.

Stephen Posner, EFSEC Compliance Manager. Mr. Posner has over 25 years experience working in various environmental regulatory programs. As EFSEC's Compliance Manager for the last 3 years, Mr. Posner is responsible for managing environmental compliance activities for facilities under EFSEC's jurisdiction. Mr. Posner also coordinates and participates in the review of applications for site certification. Prior to working at EFSEC, Mr. Posner worked for the California Environmental Protection Agency as a hazardous waste/solid waste compliance inspector. Education: Bachelor's Degree in Biological Sciences.

Jim La Spina, EFSEC Compliance Specialist. Jim has been a state environmental regulator for almost 14 years. He wrote NPDES Permits for Ecology for 11 years and joined EFSEC in September 2007 as an Energy Facility Siting Specialist. Jim is responsible for coordinating the review of a project proponent's Application for Site Certification. After the governor approves a proposed project, Jim verifies the Certificate Holder's compliance with requirements in the Site Certification Agreement. Education: Master's in Environmental Studies.

6.2 BPA

Andrew M. Montaño, EIS Project Manager, Environmental Protection Specialist. Mr. Montaño has nearly 20 years experience within the environmental field. His primary background was in water quality-related research while working as an Aquatic Biologist with his former agency, the Bureau of Reclamation. Additionally, he has also specialized in toxicology and hazardous wastes site management, nuisance species control, and some fisheries-related activities. His NEPA experience includes projects that proposed modified flow regimes on regulated rivers in the western United States as well his recent experience with transmission-

related projects. Education: MS in Environmental Science and Engineering; BS in General Studies (biology emphasis)

Amy Freel, Electrical Engineer. Mrs. Freel has 19 years of experience working at BPA of which she has been an electrical engineer for 14 years. She worked as a Substation Designer for 10 years, a Customer Service Engineer for 1 year, and as a Project Manager for the last 3 years. In her role as an electrical engineer, she designed and managed the installation of high voltage projects from the planning stage through the commissioning stage. Projects include new and up grades to substations and transmission lines 500kV and below. Education: BS, Electrical Engineering

Hub Adams, Attorney. Mr. Adams has 20 years of experience preparing environmental documents for compliance with NEPA, state "little NEPA" laws, and other environmental laws. As BPA's NEPA attorney, he is responsible for ensuring NEPA compliance for BPA's activities and assisting in the preparation of EISs and other NEPA documents. Prior to BPA, he worked as an environmental consultant managing and preparing joint NEPA/state EISs, other environmental documents, and project permitting processes for a variety of proposed projects, including complex energy, mining, and transportation projects. He is a member of the American Planning Association (APA) and the American Institute of Certified Planners (AICP). Education: JD, Certificate in Environmental and Natural Resources Law; BA, Urban and Regional Planning.

6.3 CONSULTANTS

6.3.1 URS CORPORATION

Katy Chaney, Project Manager. Ms. Chaney has over 27 years of experience. As vice president and manager of URS's Pacific Northwest environmental services, her management responsibilities include environmental impact statements, permitting efforts, and planning and siting studies. Education: BA, Political Science.

Dale Bennett, JD, Senior Planner. Mr. Bennett has 20 years of experience managing large and small planning, land use, regulatory, and remote sensing projects.

Mark DuLaney, Senior Graphics Illustrator. Mr. DuLaney has over 30 years of experience in graphic illustration and design. He has experience using Corel Draw and Corel Photo Paint, PageMaker, and Power Point. Education: Air Force 223X1 course in Technical Illustration and drawing classes at The New School of Visual Concepts.

David Every, PhD, Senior Ecologist. Dr. Every has over 30 years of experience as an environmental consultant on wetland and terrestrial ecological issues throughout the United States. Education: PhD, Botany; MS, Botany; BS, Zoology.

Mike Kelly, Senior Archaeologist. Mr. Kelly has 27 years of experience in cultural resource management and has been responsible for directing numerous archaeological investigations throughout the Pacific Northwest, California, and the Great Basin. Education: MA, Anthropology; BA, Anthropology.

Louise Kling, Ecologist and Environmental Planner. Ms. Kling has over 15 years of experience in fisheries and wildlife research, with an emphasis on disturbance ecology. She is well versed in survey methods used to quantify a variety of taxa, including terrestrial and aquatic habitat. She has implemented and managed projects for public agency, university, and private sector clients. Her analytical skills include a wide range of multivariate statistical methods and spatial analysis using GIS. For the past three years, she has focused on visual resource assessment and ecological design, land use evaluation, and environmental justice in support of the NEPA process. Her experience in visual resources assessment includes BLM, USFS, FHWA, and US Army Corps of Engineers methodologies and management of georeferenced photosimulation production. Her expertise has been applied to energy facilities siting, energy transmission, pipeline and transportation projects. In addition, she currently serves as a visual resources technical advisor to the Columbia River Gorge Vital Signs Indicator Project.

Sarah McDaniel, RPA, Staff Archeologist. Ms. McDaniel provides technical support for URS Corporation's cultural resources program in the Pacific Northwest Region and California. Responsibilities include archaeological site identification, recordation, and evaluation; historic resource documentation; and preparation of summary reports for compliance with federal and state regulations. Ms. McDaniel has six years of experience in cultural resources management and archaeological investigations.

Dan Meier, Engineering Geologist. Mr. Meier is a Certified Engineering Geologist located in Portland, Oregon. He has over 17 years of professional geologic experience in the western United States. His specialties include on-site geologic mapping, subsurface exploration, as-constructed geologic mapping, construction inspection, interpretation of field data, and preparation of maps and reports. He is experienced in seismic hazard evaluations, landslide evaluations, engineering geology and construction management and inspection.

Dautis Pearson, Environmental Planner. Mr. Pearson is a Senior Planner, NEPA, Endangered Species Act, and Federal/State agency and private compliance specialist. He has 23 years of experience in land management planning; interdisciplinary and interagency team leading and facilitation, and NEPA/SEPA environmental preparation. Dautis' experience with all federal agencies' NEPA and Endangered Species Act process provides great insight into various agency directions for collaboration and streamlining. He has 12 years of experience with USFS as a Land Use Planning Specialist and has supported or managed several energy and transmission related or linear projects. Education: BS, Biology; Riparian and Fire Ecology; Forestry; Silviculture.

Mark Storm, Senior Noise Control Engineer. Mr. Storm has over 18 years of experience managing tasks for environmental noise regulation review, field surveys, acoustical impact assessment, mitigation planning and compliance evaluation for various energy project types such as solar-to-thermal, wind turbine, biomass and natural gas. He is INCE board certified.

Jeff Walker, Botanist and Wetland Biologist. Mr. Walker has over 10 years of experience as a botanist. He has conducted vascular and nonvascular plant surveys, performed monitoring of rare plant populations, and conducted wetland delineations and evaluations. Education: BS, Botany and Environmental Studies.

6.3.2 WEST, INC

Kimberly Bay. Ms. Bay has 9 years of experience working primarily on the coordination of the data and reports for wind-energy projects. This task includes data and database management, data quality assurance/quality control, data analysis, and finally compiling the results for the reports. She has experience with most statistical computer packages including SAS, R, SPLUS, and SPSS, the database application ACCESS, and the GIS application ARCVIEW.

Greg Johnson. Mr. Johnson has over 22 years of consulting experience in wildlife and ecological studies. He is a Certified Wildlife Biologist through The Wildlife Society, a Professional Wetland Scientist through the Society of Wetland Scientists, and a certified Senior Ecologist through the Ecological Society of America. His specialty areas include wildlife research with an emphasis on contaminants and wind power development; endangered species; wetland delineation, mitigation, and functional value assessment; and vegetation sampling. He has supervised 17 field studies to assess effects on terrestrial and aquatic wildlife of pesticides and other contaminants throughout the US. Over the last 14 years, he has studied wildlife-windpower interactions at proposed or existing wind energy facilities in 16 US states and Alberta, Canada, and is currently Project Manager for the first large-scale greater sage-grouse telemetry study to evaluate impacts of wind energy development on this species.

Tamara Enz, Research Biologist. Tamara Enz is a project manager and biologist for WEST. After becoming fluent in Japanese, Tamara learned the more challenging language of botanical terms, earning a Master's of Science in plant biology at the University of Massachusetts, Amherst. Working throughout New England, Puerto Rico, and Montana, Tamara conducted community and wetland delineations and habitat suitability studies, coordinated rare plant searches, and participated in numerous research projects ranging from genetics studies to weed control. She has also done extensive bird work, including breeding and migratory bird surveys and point counts, banding, and call playback response surveys in New England, Alaska, Montana, and Canada. Her mammalian experience includes an ice based bowhead whale census in Barrow, Alaska, lynx tracking surveys in Wyoming, and general track surveys in Maine.

Jeffrey Gruver, Research Biologist. Jeff Gruver joined WEST in 2007. Jeff has been involved in bat research since 1996, and has studied bat ecology in the Pacific Northwest, the Rocky Mountains, and the Badlands of southern Alberta. He earned a B.S. in Economics (1993) from Penn State University and an M.S. in Zoology and Physiology from the University of Wyoming (2002). Jeff's M.S. research examined the assemblage of bats near a wind power facility in southern Wyoming in relation to documented bat fatalities at the facility. His PhD research focused on the how physiological constraints influence ecological responses of bats in northern arid climates. Jeff has authored or co-authored scientific publications on topics ranging from species conservation assessments to factors influencing bat fatality risks at wind energy installations.

6.3.3 NORTHWEST WILDLIFE CONSULTANTS, INC

Scott Downes, Bob Gritski, and Karen Kronner. Northwest Wildlife Consultants, Inc. is an environmental consulting firm based in eastern Oregon and Washington. They specialize in wind energy studies and bird, reptile, amphibian and mammal surveys. They are partnering with

the WDFW and Oregon Department of Fish and Wildlife on ferruginous hawk telemetry studies in the Columbia Basin.

6.3.4 GEODATASCAPE, INC

Chris Watson. Mr. Watson, owner of GeoDataScape, has over ten years of experience in providing GIS and visual simulation experience for a variety of projects. He has worked as a field geologist. Education: MS and BS, Geology.

6.3.5 TURNSTONE ENVIRONMENTAL

Jeff Reams, Wildlife Biologist. Mr. Reams is also a partner with Turnstone Environmental Consultants, Inc. for 14 years. He is the senior wildlife biologist and oversees the northern spotted owl, northern goshawk and western gray squirrel surveys. Education: BS Oregon State University

Devin Sahl, Wildlife Biologist. Mr. Sahl has been employed by Turnstone Environmental Consultants Inc. for past 8 years. He served as a wildlife biologist and as the field coordinator on the Whistling Ridge project. He was involved with the northern spotted owl, northern goshawk and the western gray squirrel survey efforts associated with the project.

6.3.6 CARROZ CONSULTING

Katie Carroz, Socioeconomist. Ms. Carroz has 10 years of environmental analysis experience specializing in economic, socioeconomic, environmental justice, demographic, and fiscal analyses, and EIS preparation and coordination. Education: MA, Economics with an emphasis on natural resources; BA, Economics with minor in environmental studies.

6.3.7 CARDNO ENTRIX, INC

Jeremy Pratt, Project Manager. Jeremy Pratt leads the ENTRIX Western Division Environmental Management, Permitting and Compliance practice. Jeremy has more than 30 years' experience preparing environmental documents for compliance with NEPA, and throughout his career he has focused on managing large-scale, controversial projects to resolve long-standing resource conflicts in complex regulatory environments. Jeremy works with project applicants and local stakeholders concerned with the development, use, protection or environmental management of their sites, communities, or resources. He works easily in both the technical and policy areas to evaluate the environmental effects of proposed actions, programs, or projects; achieve permits and assure regulatory compliance; or develop management plans. Education: BS Interdisciplinary Studies, Evergreen State College; MS Environmental and Energy Sciences, Washington State University.

Jan Aarts, Deputy Project Manager. Mr. Aarts has over 25 years of experience preparing technically sound and legally defensible environmental documents for a wide variety of energy-related projects in the Pacific Northwest. Projects have included wind energy projects, geothermal exploration projects, hydroelectric projects, natural gas pipelines, and high-voltage transmission lines. Mr. Aarts has prepared the full range of NEPA environmental documents, including Notices of Intent, Documented Categorical Exclusions, Environmental Assessments,

Environmental Impact Statements, Findings of No Significant Impact, and Records of Decision. He has also prepared the full range of State Environmental Policy Act (SEPA) environmental documents, including Environmental Checklists and Environmental Impact Statements. His technical expertise includes the subjects of land use, regulatory compliance, recreation, socio-economics, community impacts, environmental justice, public services, utilities, and cumulative impacts. He is also experienced at managing the work of other technical experts conducting cultural resource investigations, air and noise studies, hazardous waste investigations, fish and wildlife studies, biological assessments, wetland delineations, stream studies, and mitigation plans.

Chelsea Ayala, Air Quality Specialist. Ms. Ayala has over 17 years of regulatory agency, analytical laboratory, and environmental consulting experience. She has served as project manager, deputy project manager, senior reviewer, technical writer, and technical lead for environmental projects throughout California and the United States. Her areas of expertise include air quality, noise, and climate change for a variety of projects, including oil and gas pipelines, electric transmission lines, and water projects. She has experience preparing environmental documentation for Projects involving NEPA and state environmental policy laws and has managed multiple projects for electric transmission lines and prepared environmental analyses for multiple oil and gas projects. Education: BA Environmental Studies, California State University.

Eliza Ghitis, Geomorphologist. Eliza Ghitis has a background in coastal, estuarine and fluvial geomorphology, specializing in the ways physical systems interact with ecology. She has managed numerous salmon habitat restoration projects through all phases of design, permitting, implementation, and post-construction monitoring and maintenance. She has conducted ecological and geomorphic studies, including study design, data collection, data analysis and compilation of reports, and preparation of numerous NEPA environmental documents and NEPA technical supporting documents. She is trained in environmental hazard assessment and mitigation, including slope stability, water quality, and relative sea level rise. Education: MS Environmental Geomorphology, Oxford University; BS Earth and Space Sciences, University of Washington.

Dave Harvey, Historian. Mr. Harvey has over 30 years of experience in historic preservation, cultural resources management, architectural history, and historic research in the Pacific Northwest, California, Alaska, and Montana, and has assisted federal and state agencies, local governments and utilities, and private architectural and engineering firms in carrying out their cultural resources obligations under sections 106 and 110 of the National Historic Preservation Act (NHPA) and NEPA (EA/EIS). Mr. Harvey has worked closely with federal land management agencies, such as the U. S. Forest Service, National Park Service, Bureau of Reclamation, Bureau of Land Management, and U. S. Army Corps of Engineers throughout the Pacific Northwest and Alaska, where he conducted determination of National Register eligibility studies, Historic American Building Survey/Historic American Engineering Record (HABS/HAER) documentations, assessments of agricultural/early settlement landscapes, and historic land use studies. Education: MA History/Historic Preservation, Western Washington University; BA History and Government, Fairleigh Dickinson University.

Melissa Klungle, Environmental Scientist. Ms. Klungle has ten years of experience in environmental science consulting specializing in terrestrial and aquatic biology, and environmental policy. Ms. Klungle has experience preparing federal and state environmental documentation for energy projects. Education: BS Fisheries and Wildlife Management, Michigan State University.

Gretchen Lebednik, Biologist. Ms. Lebednik has managed numerous restoration, monitoring, and permitting projects. Ms. Lebednik has served as principal biologist or principal botanist in the preparation and review of Biological Assessments/Evaluations, FERC documents, NEPA/CEQA documents, California Energy Commission applications, and mitigation plans for projects in a variety of habitats in California and the Pacific Northwest. She has extensive training and field experience in plant ecology and taxonomy on the Pacific Coast and has performed numerous field investigations in freshwater seasonal wetland, vernal pool, riparian, estuarine, alkali meadow, coastal dune, desert, grassland, foothill woodland, and montane communities in California. Ms. Lebednik has served as principal biologist or principal botanist in the preparation and review of Biological Assessments/Evaluations, FERC documents, NEPA/CEQA documents, California Energy Commission applications, and mitigation plans for projects in a variety of habitats in California and the Pacific Northwest. Education: MS Botany, University of Washington, BA Environmental Biology, University of California.

Darcey Miller, Environmental Biologist. Ms. Miller has twelve years of experience in environmental science consulting, specializing in wetland biology, wildlife habitat, and environmental permitting and policy. She has designed and monitored restoration and mitigation projects, led field efforts for delineations and biological assessments, and coordinated with agencies at all levels to assist clients in obtaining environmental permits. Ms. Miller has experience preparing and editing federal and state environmental documentation for linear and other energy projects. She is a Professional Wetland Scientist and a member of the Society of Wetland Scientists. Education: BS, Environmental Science, additional major in English, University of Mary Washington.

Kirk Ranzetta, Cultural Resource Specialist. Dr. Ranzetta has over fourteen years of private, public, and non-profit sector work experience in cultural resource management, historic preservation, and environmental permitting including NEPA and state environmental policy laws. He has extensive experience in the Pacific Northwest, Midwest, and Mid-Atlantic regions managing, technically reviewing, and completing cultural resource surveys for compliance with Section 106 of the NHPA and NEPA (EA/EIS). He has also served as a technical editor, drafted text, and conducted fieldwork for cultural resource reports and other NHPA and NEPA related-documents. Prior to working at ENTRIX, Dr. Ranzetta served as the Review and Compliance Coordinator for the Oregon SHPO where he consulted with federal agencies on hundreds of projects, evaluated cultural resource reports for technical sufficiency, assisted agencies in the negotiation and preparation of MOAs, and worked to streamline project reviews. This experience included working closely with cultural resources staff from the Oregon DOT, Oregon Energy Siting Council, USFS, FERC, BPA, USFWS, BIA and BLM in Oregon. These reviews were conducted in compliance with Section 106 of the NHPA, Section 4(f), NEPA, HABS/HAER requirements, ORS 358.653, and OAR Chapter 345. Education: PhD Urban Affairs and Public Policy, University of Delaware; MA Urban Affairs and Public Policy, University of Delaware; BA Historic Preservation, University of Mary Washington.

Ryan Shatt, Geologist. Mr. Shatt has over twelve years of experience as a geologist. His expertise includes Remedial Investigations, Human Health Risk Assessments, and Remedial Action. He conducts and manages environmental field investigations including supervision of subsurface drilling operations, monitoring well installation, lithologic identification, soil classification and interpretation, rock coring, borehole geophysics, and sampling of soil and ground water. He also assesses soil and ground water analytical data to evaluate compliance with applicable regulations, conducts pump test analysis and groundwater flow evaluations, performs Phase I ESAs, prepares NEPA environmental documents and manages projects. He has experience as contributing author for soil, geology, and water resources sections for numerous EIS and EA reports. Education: BA Geosciences, Penn State University.

Sandra Slayton, Environmental Scientist. Ms. Slayton has nine years of experience in environmental science consulting specializing in watershed planning, GIS, water quality, floodplain management, and environmental policy. Ms. Slayton has experience preparing federal and state environmental documentation for linear and other energy projects. She has been involved in numerous watershed planning projects including work related to water quality analysis, habitat conservation and enhancement, and hydrologic and hydraulics studies. She is a member of the American Water Resources Association. Education: MA, Ecology, University of North Carolina at Chapel Hill; BA, Environmental Science, University of Virginia.

Rachel Tamigniaux, Project Coordinator. Ms. Tamigniaux is an environmental social scientist with experience in the public, private, and non-profit sectors. She has assisted in the writing, editing and preparation of environmental documents for a wide variety of projects, including wind facilities, oil pipelines, river dredging, and hydroelectric projects. She has experience in the development of National Environmental Policy Act (NEPA) and Washington State Environmental Policy Act (SEPA) environmental documents, specifically Environmental Impact Statements (EISs), as well as experience with Section 106 processes and the development of related documents including Programmatic Agreements (PAs) and various monitoring plans. She has in-depth experience in the public comment management process, particularly for large projects. Ms. Tamigniaux has written planning guidance for environmental conferences for the U.S. Environmental Protection Agency as well as environmental policy and sustainability guidance documents for local non-profits. She is also a contributing author for the websites www.thechicecologist.com; www.theclimatecommunity.com; www.hohm.microsoft.com; and www.tag.microsoft.com. Education: MSc Environmental Social Science, University of Kent, Canterbury; BA Environmental Studies, University of Washington.

Lucy Zuccotti, Archaeologist. Ms. Zuccotti has over 12 years of technical and professional experience as an Archaeologist and Osteologist. Her background includes directing multiple field investigations in Western Washington and conducting background investigations in preparation for fieldwork. She has extensive experience writing reports summarizing research and field results in compliance with federal and state laws and regulations including NEPA and SEPA. Ms. Zuccotti has worked directly with and for Native American governments to mitigate impacts on tribal areas of interest. She is considered an expert in identification and analysis of human remains. Education: MA Anthropology, University of Arkansas; BA Anthropology, Hampshire College.

Mary J. Repar

[redacted]

27 August 2010

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Olympia, WA 98504-3172
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BPA
Public Affairs Office – DKE -7
P.O. Box 14428
Portland, OR 97293-4428
Toll-free comment line: 800.622.4519
FAX: 503.230.3285
503. 230. 4145
www.bpa.gov/comment

Re: The Whistling Ridge DEIS and the inadequacy of the data and analyses for impacts to transportation in the region

Dear EFSEC and BPA,

I am greatly concerned about what I feel is a very inadequate analysis of the actual impacts to our roads and byways by the transport of the wind turbines and other construction paraphernalia for the Whistling Ridge wind farm project. The "specialized" trucks that are needed would, I believe, create havoc on our roads and there would also be serious damage to our rural, scenic public roads. The whole issue of which roads SDS would actually use if this wind farm is approved, has not been adequately addressed in the DEIS. Skamania County authorities also fail to address impacts to our roads and byways from all the over-weight traffic for this wind farm proposal. Waiting to figure it all out after the fact is not good public policy and it certainly is not public disclosure.

I needed to educate myself on this issue and the following disturbing information is about what it really takes to transport wind turbine components. My emphasis is in **bold red.** The following is an article on what makes wind energy possible:

http://www.go-explore-trans.org/2009/nov-dec/wind_turbines.cfm

Trains, trucks, and ships make wind energy possible

by Katie Greenwood

Imagine yourself in a flat, wide-open field. Next to you, extending about 400 feet into the air is a wind turbine. Its 3 gigantic steel blades whoosh around and around hundreds of feet above your head.

A wind farm in Kansas
Photo courtesy: Brent Danley via flickr

Standing next to a wind turbine, you can witness the incredible power of the wind to move this massive machine.

But before the wind could move the turbine, something else had to move it first.

Trucks, ships, and trains move wind turbines from the factory to the wind farm. A wind farm is a group of wind turbines in the same location used to produce electricity. (Wind farms are also called wind power plants.)

In the United States, Texas and Iowa have the greatest number of wind farms because flat plains are the best sites for wind farms, but **many turbines come from factories outside of the United States.**

Just how big are they?

Wind farms range in size from a few dozen to 421 turbines. **A single turbine is transported in up to 12 pieces.**

Wind turbines are manufactured and shipped in several parts, and each part is huge.

The tall, vertical piece is called the tower. It's usually made in 3 parts but sometimes more.

A crane lifting the huge blades and hub of a wind turbine
Photo courtesy: rockymountaincrane.com

Each section of the tower is about 120 feet long and weighs up to 70 tons. An empty semi-truck and trailer weighs about 15 tons.

Attached to the top of the tower is the nacelle. The nacelle houses the generator, power electronics, and the gears that turn the wind into electrical energy. **Nacelles weigh 50–70 tons.**

Most turbines have 3 blades that are attached to the nacelle by the rotor hub. Some blades are up to 50 yards long. **A 3-blade rotor hub can almost cover a football field!**

Curriculum connection

Using geometry in a transport route survey

Before construction of a land wind farm can begin, route planners consider several possible trucking routes for the turbines.

Route planners study several factors including traffic, road construction, surrounding buildings, and environmental issues to determine the best route.

With the help of a surveyor, the route planner **assesses the steepness of hills and inclines along the route.** A surveyor can take the necessary measurements using a transit.

Students practice using
a surveyor's transit.

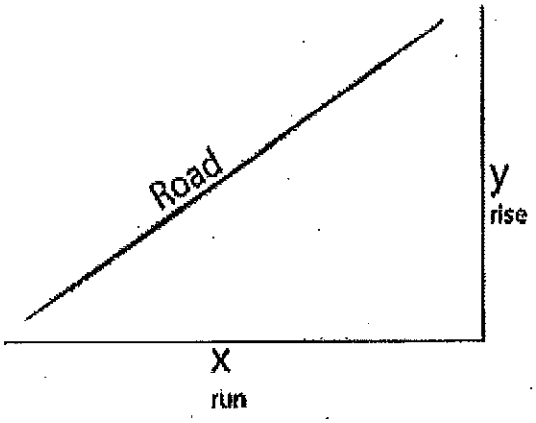
The steepness of a road's incline is called the *grade*. **Turbines can safely ascend and descend grades of less than 15%.** Steeper grades **can potentially lead to accidents that damage turbine parts or cause erosion of the soil and structure beneath the road.**

If the surveyor assesses the grade at greater than 15%, it may be necessary to level the roads or put in erosion control measures for that part of the route.

Getting the grade

How do they get the grade?

The illustration below shows a highway in profile. Notice that a right triangle has been constructed in the diagram.



An illustration of the the verticle and horizontal distances of an inclined road.

The bottom of the triangle is the horizontal distance a particular section of highway covers. This horizontal distance, or the "run" of the highway, indicates how far a vehicle would travel on the road if it were level.

The "rise," or vertical distance, is a measure of how much higher a vehicle is after driving along the road. To find the "rise," the surveyor must determine the difference in elevation from the bottom of a slope to the top.

Putting it together

Similar to calculating the slope of a line in your geometry class, calculating the incline of a road is simply "rise over run."

Slope is the measure of the vertical rise in the road divided by the horizontal distance or:

$s=y/x$

Grade is the slope expressed as a percentage. To find the percent, the slope is multiplied by 100.

$G=100s$

Try it out: If a highway rises 375 feet over 1 mile, is the grade safe for trucks hauling turbine components?

Check your answer.

So to build even small wind farms, there are many large loads that must travel long distances.

How in the world are these hulking parts moved?

The type of transportation used depends on the location of the wind farm. Often, a combination of transportation modes is used for each wind farm.

By train

A large number of turbines manufactured in the United States are first transported by train, according to Dr. Nadia Gkritza, who is currently researching sustainable energy and transportation systems at Iowa State University.

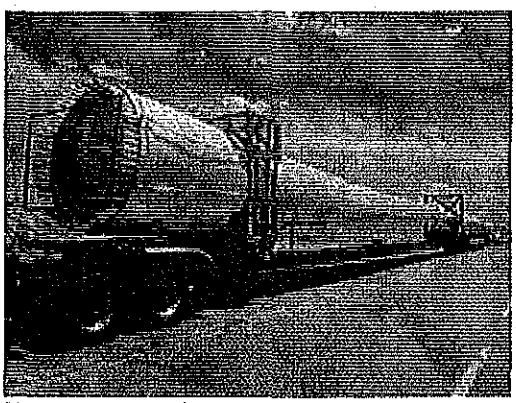
A single train can haul 50–70 cars of wind turbine parts. *Photo courtesy*: kedziers via flickr

A single train can haul 50–70 cars of wind turbine parts. It costs less to move turbine parts by train because more can be moved at a time, but the train routes **must avoid low overpasses** when hauling the large components.

But since trains don't directly connect to the wind farms, the final transportation leg must be done by truck.

By trucks

Trucking has been the most common method of transporting turbines because trucks can go directly to a wind farm.



Each wind turbine requires 8–12 semi-truck trailers. Many turbine loads weigh more than 100,000 pounds. *Photo courtesy*: Bill Weaver via flickr

Transporting by truck requires 8–12 trailers for each turbine.

Hauling the oversized loads requires a permit from the state Department of Transportation. The trucks must follow paths that avoid road construction, low bridges, and busy city centers. **Often, trucks have to take a long route to their destination when transporting turbines.**

Many wind farms are located within crop farmland. **This means that these heavy parts travel** on narrow, unpaved roads that are not designed to accommodate the heavy loads. Immediately after a wind farm is completed, **maintenance workers must repair and level the roads.**

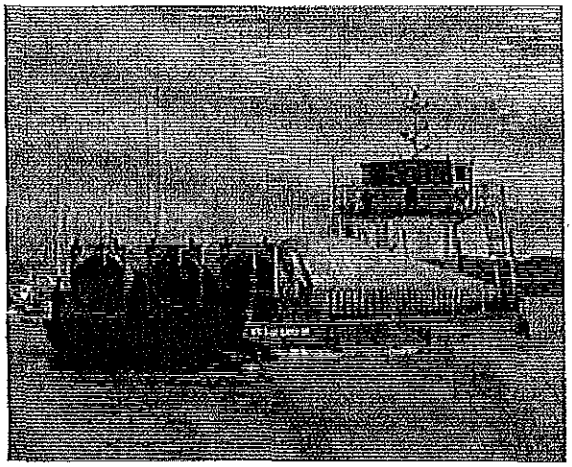
Highways and interstates can handle about 80,000 pounds. Many turbine loads weigh more than 100,000 pounds, so transporting turbines can cause damage to even these roads over time.

By ships

When turbine components come from overseas, they are imported in several shipments. Each ship carries only 1 type of component.

When Vestas imported 60 turbines into the Port of Longview in Washington, **all the components arrived in 5 shipments.** The towers **arrived in 3 separate shipments followed by 2 shipments of nacelles and blades.**

The fragile loads must be packed tightly but carefully to avoid damage. Safety must also be considered to avoid interfering with the ship's stability and navigation.



Ships and barges don't have to negotiate tight turns or avoid overpasses like trucks and trains. *Photo courtesy*: GrahamAndDairne via flickr

There are specific ways of lashing and securing the parts to the ship. When shipped long distance, blades are shipped in transport containers to keep them from shifting around.

As wind energy technology advances, new wind farms are being erected off shore. An offshore wind farm in Nantucket Sound, Massachusetts, is scheduled to begin in 2010. The project is being called Cape Wind.

One advantage to transporting by ships and barges: **they don't have to negotiate tight turns or avoid overpasses like trucks and trains.**

Learn More

The American Wind Energy Association offers an excellent wind energy tutorial that discusses the basics of wind power.

Katie Greenwood is a writer for *Go!*.

Go! is brought to you through the generous donations and grants of our sponsors, including these platinum-level sponsors: the Iowa Math and Science Education Partnership, the Federal Highway Administration, and the Midwest Transportation Consortium.

Learn more about all our sponsors.

IOWA STATE UNIVERSITY
Institute for Transportation

In conclusion, some of the issues and disturbing facts about what it really takes to transport and build a wind farm:

- many turbines come from factories outside of the United States;
- **A single turbine is transported in up to 12 pieces;**
- **Each section of the tower is about 120 feet long and weighs up to 70 tons.** An empty semi-truck and trailer weighs about 15 tons;
- **Nacelles weigh 50–70 tons;**
- A 3-blade rotor hub can almost cover a football field!;
- Route planners study several factors including traffic, road construction, surrounding buildings, and environmental issues to determine the best route; assesses the steepness of hills and inclines along the route;
- **Turbines can safely ascend and descend grades of less than 15%.** Steeper grades **can potentially lead to accidents that damage turbine parts or cause erosion of the soil and structure beneath the road;**
- If the surveyor assesses the grade at greater than 15%, it may be necessary to level the roads or put in erosion control measures for that part of the route;
- So to build even small wind farms, there are many large loads that must travel long distances;
- A single train can haul 50–70 cars of wind turbine parts. It costs less to move turbine parts by train because more can be moved at a time, but the train routes must avoid low overpasses;
- Transporting by truck requires 8–12 trailers for each turbine;
- Often, trucks have to take a long route to their destination when transporting turbines;
- Many wind farms are located within crop farmland. **This means that these heavy** parts travel on narrow, unpaved roads that are not designed to accommodate the heavy loads. Immediately after a wind farm is completed, **maintenance workers must repair and level the roads;**
- Highways and interstates can handle about 80,000 pounds. Many turbine loads weigh more than 100,000 pounds, so transporting turbines can cause damage to even these roads over time;
- When turbine components come from overseas, they are imported in several shipments;
- When Vestas imported 60 turbines into the Port of Longview in Washington, **all the components arrived in 5 shipments.** The towers **arrived in 3 separate shipments followed by 2 shipments of nacelles and blades;**
- One advantage to transporting by ships and barges: **they don't have to negotiate tight turns or avoid overpasses like trucks and trains.**

Analysis on grades and transportation requirements is totally inadequate in the DEIS. The Whistling Ridge proposal involves grades ranging from 5% to 70%. More expert survey data is needed for the DEIS. More analysis and data is needed on just how much the transport trucks and the wind infrastructure materiel actually weigh and how much damage they might do to our rural roads and byways. And, I think we all need to know just how SDS really proposes to get these huge, heavy, and unwieldy turbines up steep slopes that are prone to

erosion and mass wasting! **(Mass wasting and soils will be addressed in a separate memo.)**

The DEIS is totally inadequate on the transport issue. Thank you.

/e-signature/**Mary J. Repar**
27 August 2010

Michelle, Kayce (UTC)

From: repar [redacted]
Sent: Friday, August 27, 2010 4:44 PM
To: EFSEC (UTC)
Subject: Addendum to Whistling Ridge comments (e-mail 4) on transport
Attachments: DEIS_turbine_specifications_27Aug2010.pdf

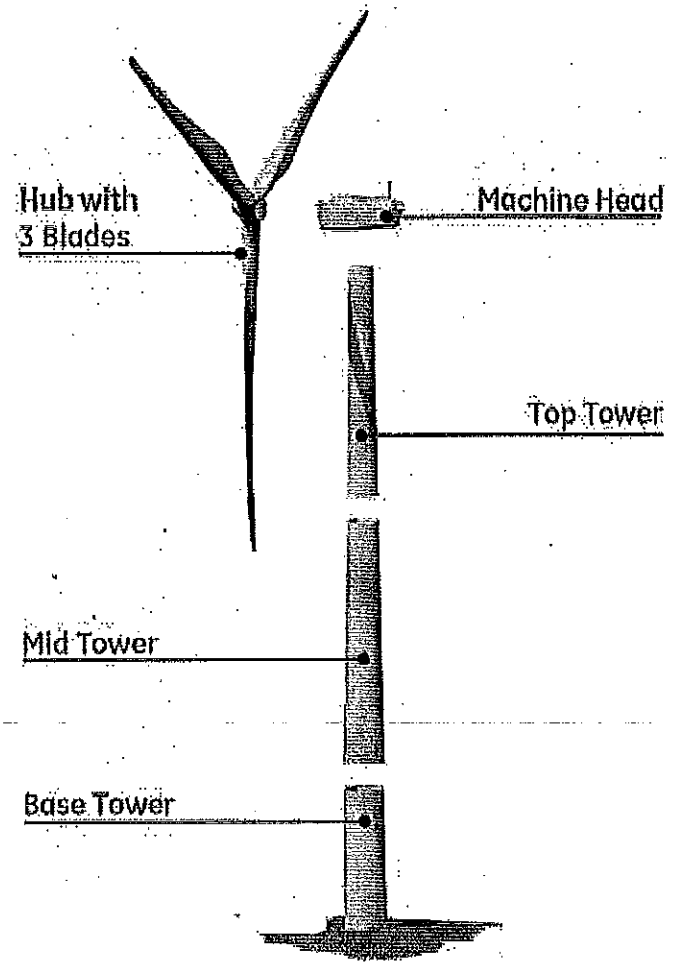
Importance: High

Dear EFSEC,
Attached, please find a pdf file, DEIS_turbine_specifications_27Aug2010.pdf, that I wish to be attached to my previous e-mail on transportation. It was #4 in the subject line. I'm sorry that some of the pictures are cut off—my technical expertise has failed me late in the day! Thank you very much.

Mary J. Repar

[redacted]

Mesalands Community College
Wind Turbine Specifications



Dimensions & Weights

Hub height – 80 meters or 253.6 feet

Tower Components

Component	Weight(lbs)	Length(Ft.)	Diameter(Ft.)
Base Section	126,766	73.2	15 to 14.1
Middle Section	83,445	82	14.1 to 11.2
Top Section	65,936	98.4	11.1 to 8.4

Other Components

Component	Weight (lbs)	Length(Ft.)	Diameter (Ft.)
Hub	37,479	N/A	10.5
Blade	13,889	121.4	6.4

Rotor (assembly)	79,146	N/A	252.6
Nacelle	121,916	28.9	12.5x12.5

Foundation

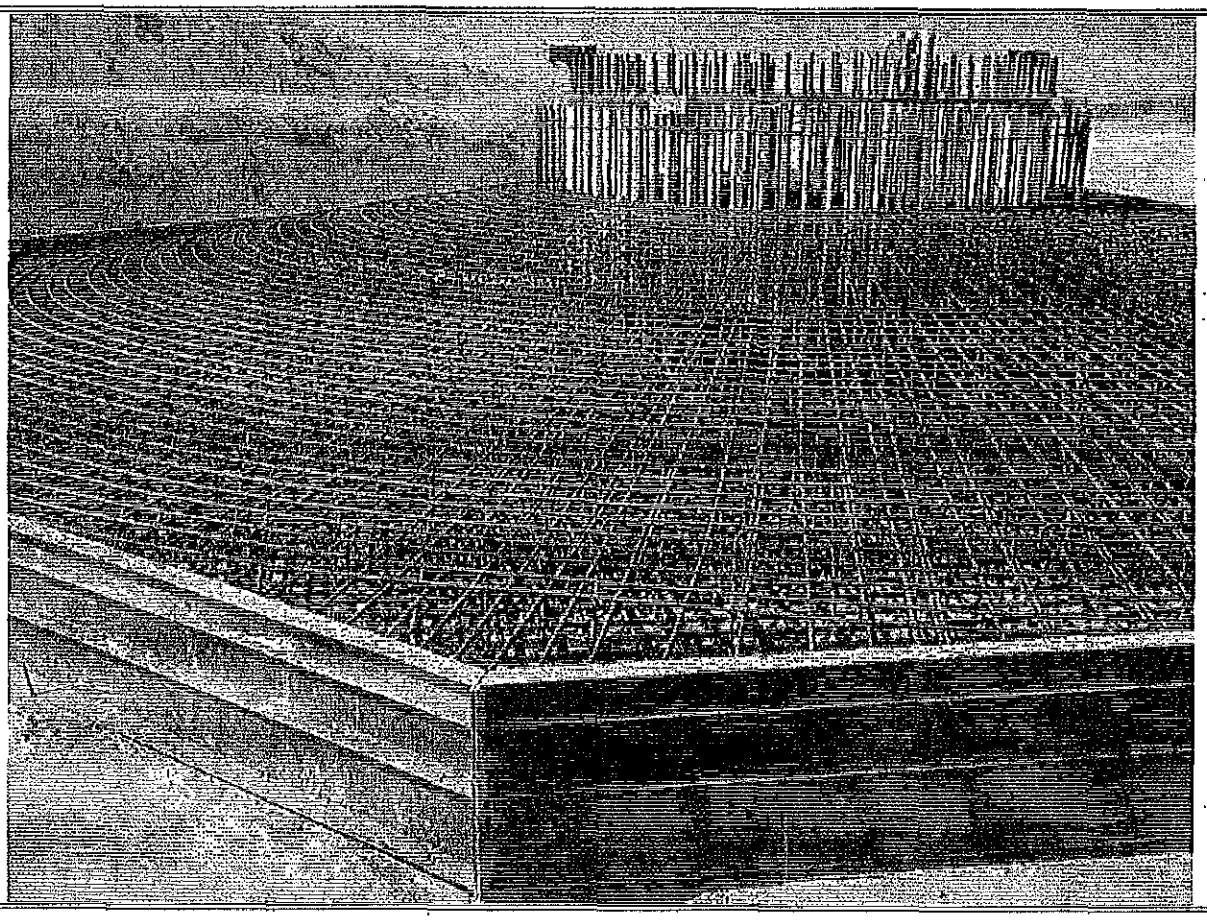
Foundation is 45 feet across by 9 feet thick and is installed below the existing ground plane:

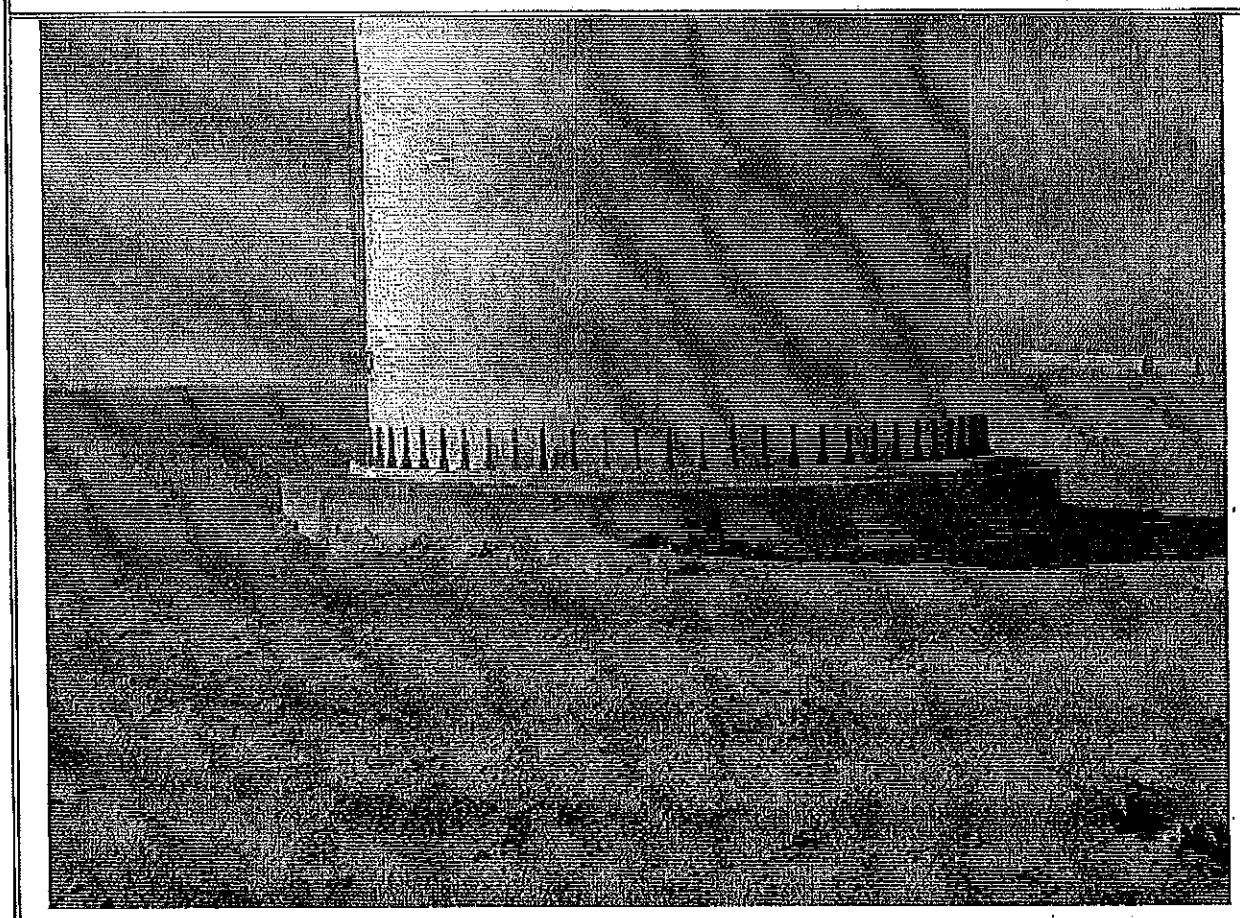
12,150 cubic fee

450 cubic yards

742 Tons of concrete (using 3,300 lb/yd^3)

45 trucks of concrete



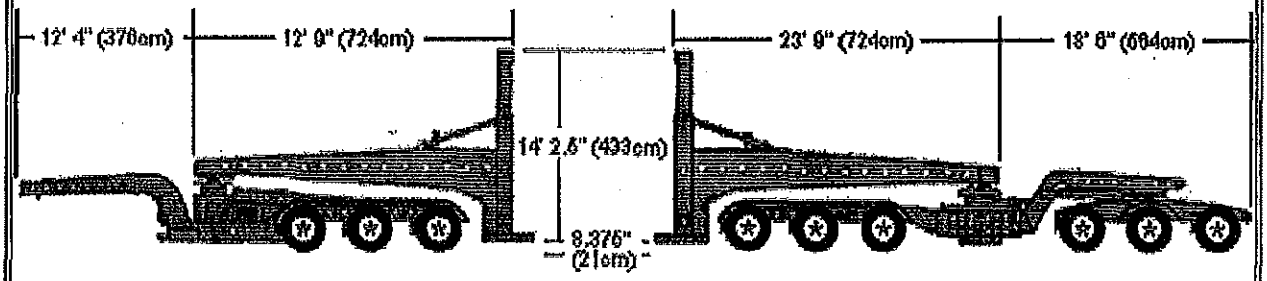


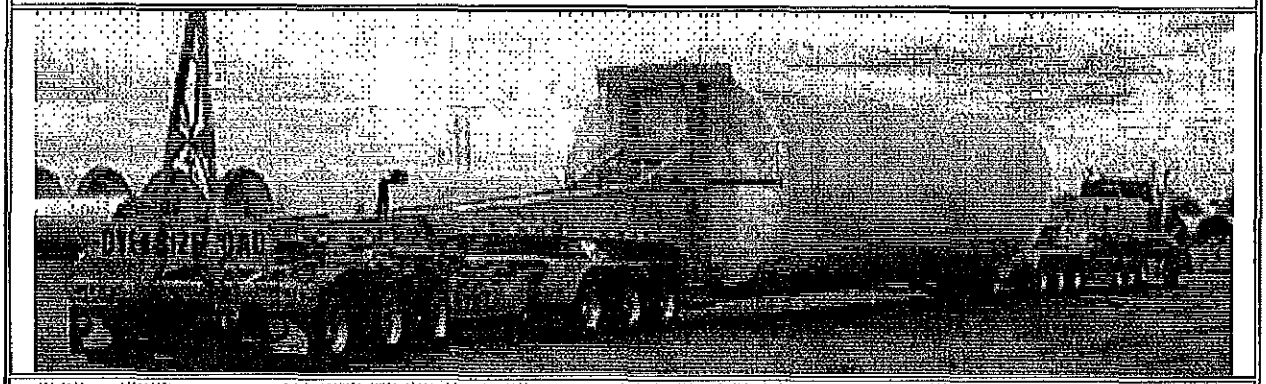
Tower Section Transportation

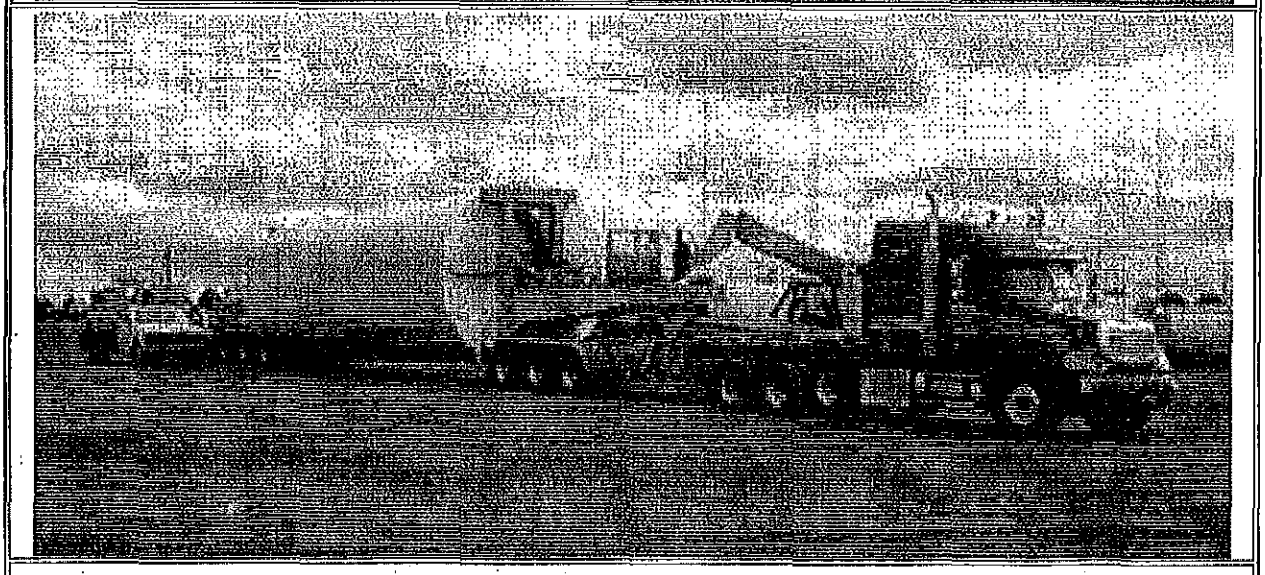
Wind Turbine arrived October 14th, 2008.

There was 7 trucks hauling the turbine but only some were just normal trucks. For tower segments, transportation used Schnable type trailers, the tower section is connected to the Schnable attachments of the trailers. The tower section thus forms an integral part of the trailer arrangement and is not supported on any kind of chassis

6 AND 9 AXLE SCHNABLE WITH STEERABLE DOLLY

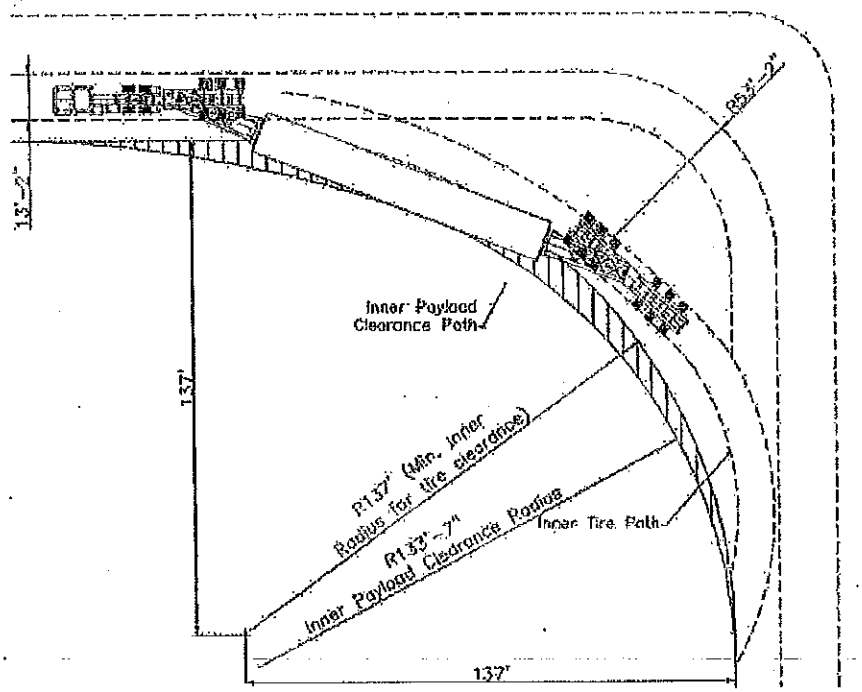




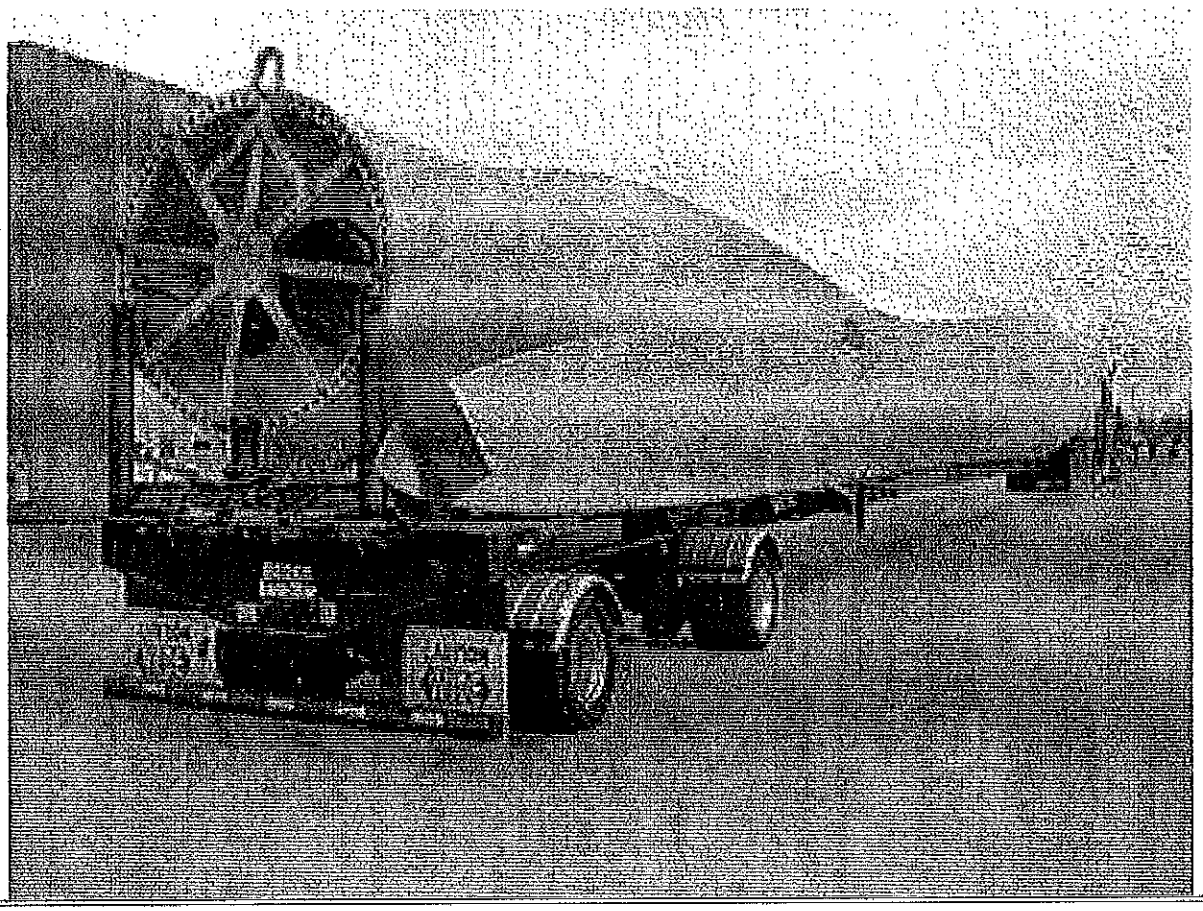


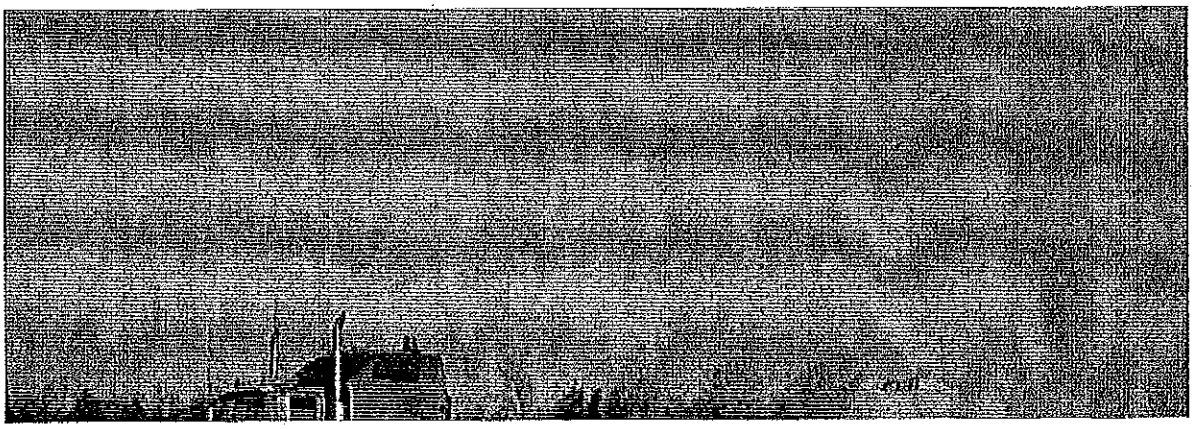
A Schnable trailer with the base tower loaded is the least maneuverable transport arrangement

that will negotiate the site roads. Although Schnable trailers are the most prevalent mode of transportation for tower section, it cannot be guaranteed that these trailers will be used on a specific project.



Other turbine components are shipped using special designed trailers.





Traffic Volume

Traffic:

45 - concrete trucks

7 - trucks hauling wind turbine

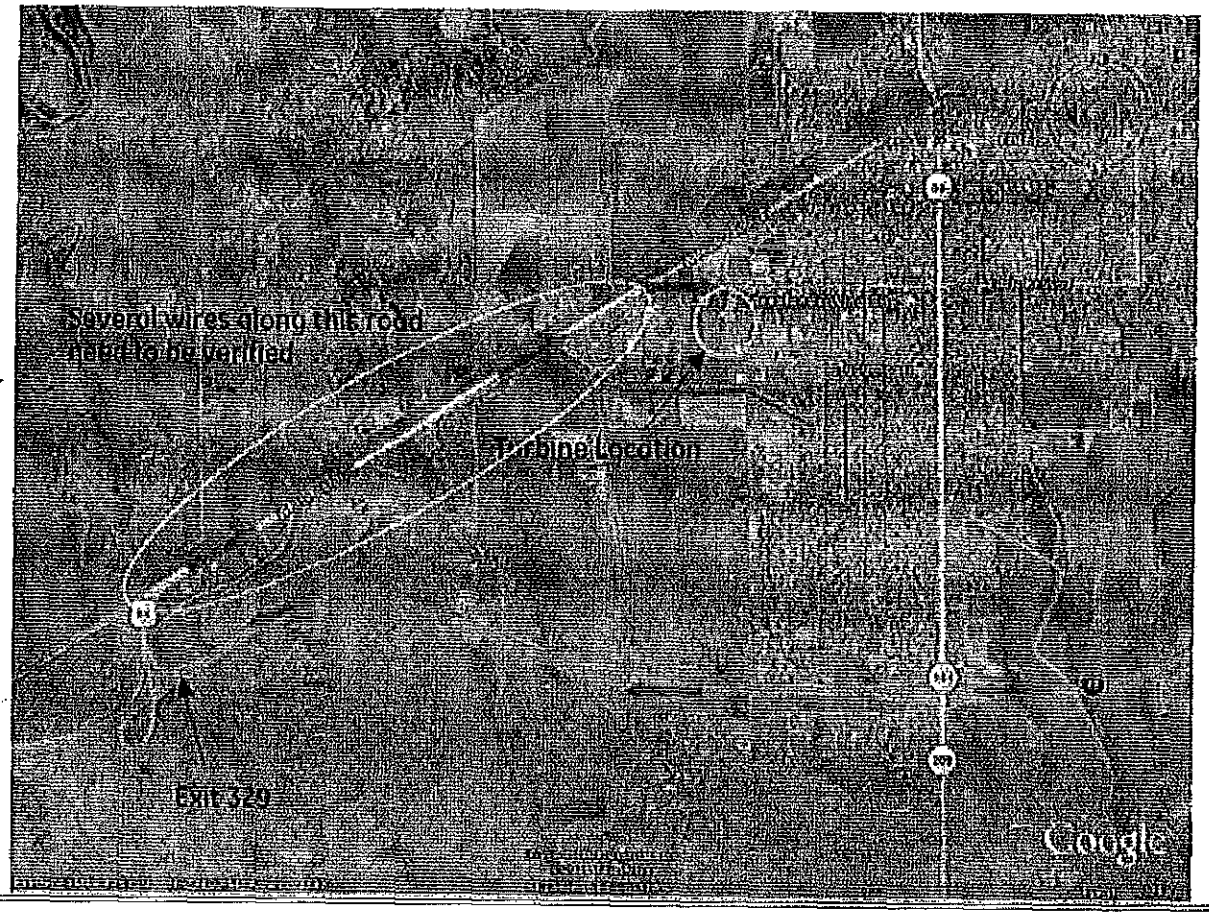
6 - trucks hauling 2 cranes (largest is 400 ton crane)

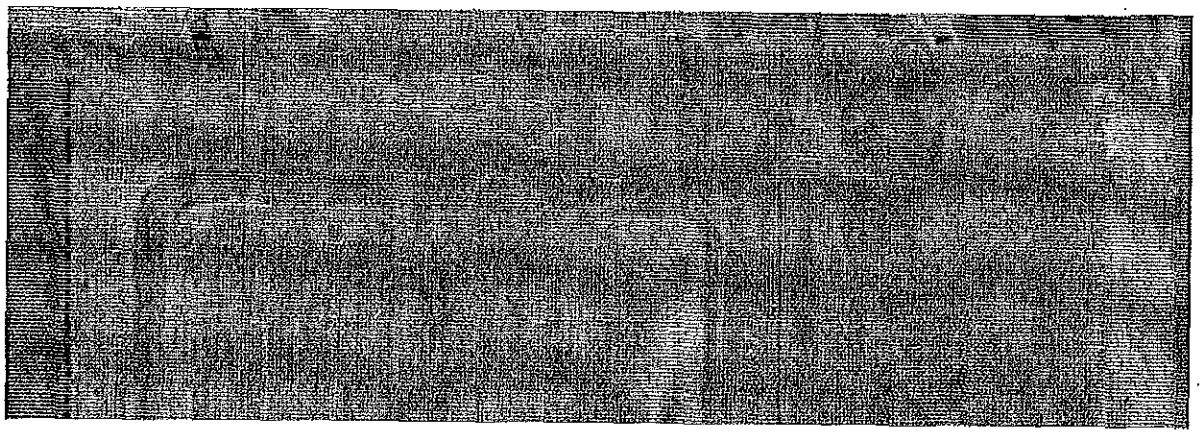
2 - trucks hauling 20 tons of rebar

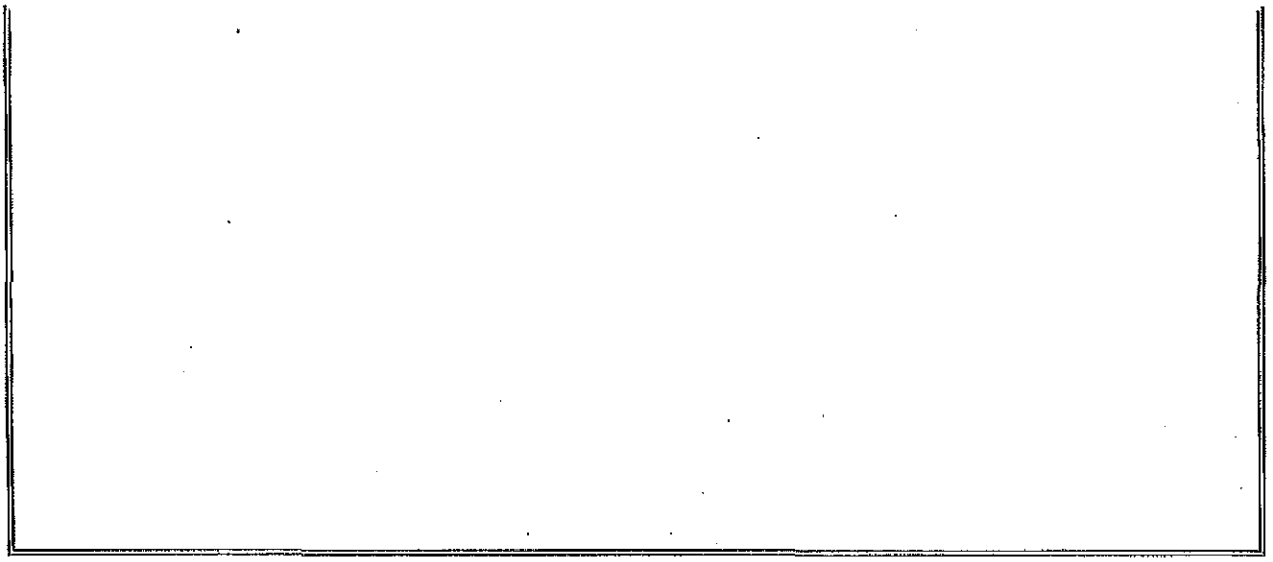
2 – trucks hauling various moving equipments such as fork lifts

Wind Turbine Logistics

- **Observers were asked to remain on the East side of 11th Street**
- **Bleachers were provided on the East side of 11th Street**
- **Cars were not allowed on the West side of 11th Street**
- **Police Escort was required from I-40 Exit 329**
- **Point of origin for tower sections was Trinity, Texas**
  - **Transit time 8 hours**
- **Point of origin for nacelle was Pensacola, Florida**
  - **Transit time 22 hours**
- **Point of origin for blades was Tecis, Port of Import – Houston, Texas**
  - **Transit time 14 hours**


Several wires along this road need to be verified
Turbine Location
Exit 329
Google





Michelle, Kayce (UTC)

From: repar [redacted]
Sent: Friday, August 27, 2010 11:04 AM
To: EFSEC (UTC)
Subject: Comments-Whistling Ridge-cap and flex-Repar-5
Attachments: Comments_DEIS_BPA_capacity and flexibility_27Aug2010.doc

Importance: High

Dear EFSEC,
Attached, please find my 5th memo, on BPA capacity and flexibility, for the Whistling Ridge wind farm proposal. Thank you.

Mary J. Repar
[redacted]

Mary J. Repar
[redacted]

27 August 2010

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Re: Comments on the inadequacy of Whistling Ridge DEIS in regard to the integration of wind power into the power grid; backup sources for wind when there isn't any; wind powers effects on the energy grid, etc.

Dear EFSEC and BPA,

I would like to further address the issue of wind power generation in the Pacific NW and the fact that "wind generation needs back-up, flexible sources to handle unexpected changed in its output." I have made comments in the memo entitled Comments_DEIS_Chap. 3_Environment_Impacts_Mitigation_27Aug2010, but in this document I would like to go further in depth about my concerns that were not addressed in the Whistling Ridge DEIS, concerns that I feel BPA should have addressed in the DEIS and they did not. The document that helped to crystallize my concerns about the lack of information on wind power integration and the integration of wind power into the energy grid, is the Sixth Power Plan done by the NW Energy Council, and the document is located at http://www.nwcouncil.org/energy/powerplan/6/final/SixthPowerPlan_Overview.pdf.

My comments are ***bolded and italicized, located after sections upon which I wish to comment.*** Most of this information was not included in the DEIS and it should have been part and parcel of the discussion. Its lack of inclusion is a fatal flaw in the DEIS and should be addressed by BPA, SDS, and EFSEC. I have not included the entire document. The document is in quotation marks:

"As a result, planners must now consider potential resources in terms of their **energy, capacity, and flexibility contributions. The rapid growth of wind generation (which has little capacity value and increases the need for flexibility reserves) means that**

meeting growing peak load and flexibility reserves will require adding these capabilities to the power system. Changes can be made to the operation of the power and transmission system that will reduce flexibility reserve needs. These operational changes are expected to cost less than adding peaking generation, demand response, or flexibility storage, and they can be implemented more quickly. **Wind generation needs back-up, flexible resources to handle unexpected changes in its output.**

Comment: Wind power has "little capacity value and increases the need for flexibility reserves" which basically means that wind power needs backup sources, which means coal-power, gas plants, hydro power, or some other sources. Sources which probably contribute more CO2 to the environment. The DEIS does not address the issue of the unreliability of wind, the lack of storage capacity in wind power, and the need for backups to the power system to balance or leaven the production of wind energy. Why isn't this information in BPA's portion of the DEIS? Oh, I forgot. BPA didn't contribute very much pertinent energy production and infrastructure information to the DEIS so that's why we don't have all the information needed to make a thoughtful and studied decision about the feasibility or desirability of this wind farm proposal! How much flexibility and capacity will have to be added to BPA's energy production in order to balance wind power?

While the problems appear daunting, particularly in integrating new wind generation with a more constrained hydrosystem, there are solutions. The first step is to change system operating procedures and business practices to more fully utilize the inherent flexibility of the existing system. The Council believes these changes will be significantly cheaper to achieve, and can be implemented sooner than adding additional generating capacity solely to provide flexibility. It will also set the stage for determining how much flexibility will ultimately be needed from new generation.

Actions for these operating and business practice changes include: **establishing metrics for measuring system flexibility; developing methods to quantify the flexibility of the region's existing resources; improving forecasting of the region's future demand for flexible capacity; improving wind forecasting and scheduling; transitioning from the current whole-hour scheduling framework to an intra-hour scheduling framework; and increasing the availability and use of dynamic scheduling. Fully implementing these improvements may also require physical upgrades to transmission, communication, and control facilities, though the cost of these upgrades is expected to be relatively small compared to the cost of adding new flexible capacity.**

Comment: What are the metrics for measuring system flexibility? What are the methods to be used to quantify the flexibility of the region's existing resources? How will BPA improve forecasting of the region's future demand for flexible capacity? How will BPA and the wind industry improve wind forecasting and scheduling? How will BPA transition from current whole-hour scheduling to intra-hour scheduling? How will BPA increase the availability and use of dynamic scheduling? What is dynamic scheduling? Will it cost the rate payers more money to implement all of these

efforts to integrate unreliable wind power into the existing power grid? If physical upgrades to transmission, communication, and control facilities will be required, what are the costs going to be? To the regional rate payers? Tax payers? What are the cumulative regional impacts of the existing transmission lines? What would be the future cumulative impacts of new transmission lines? Where would these new transmission lines be located? How big would they be? How would they affect wildlife and wildlife habitats? Habitat fragmentation? These are only some of the questions that BPA should have addressed in the Whistling Ridge DEIS. They did not and this is a fatal flaw in the DEIS.

The Northwest Resource Adequacy Forum, jointly chaired by the Council and Bonneville, with participation by other regional utilities and interest groups, has devoted considerable effort over the past several years to reaching an understanding of the hydrosystem's sustainable capacity value. The work of the forum is described more fully in Chapter 14.

Comment: So Bonneville, which is BPA, sits on the Northwest Resource Adequacy Forum, and they have "devoted considerable effort…to reaching an understanding of the hydrosystem's sustainable capacity value." Care to share with the rest of us, BPA? What is the sustainable capacity value of our hydrosystem? How much sustainable capacity does BPA actually have? If there is too much capacity, from all these regional wind farms, does it become unsustainable? What happens to unsustainable capacity? Does too much capacity affect the BPA infrastructure? How is the infrastructure affected if capacity reaches unsustainable levels? Are there inherent dangers in unsustainable capacity? Dangers to the BPA infrastructure? Dangers to the general public and energy users? These questions, and many more relevant ones, should be addressed in the DEIS, by BPA. They are not. A fatal flaw.

Wind generation capacity also raises capacity issues because it is not controllable. Wind generation is variable; operators can reduce generation when the wind is blowing, but they cannot make it produce more, even if the rated wind capacity is much higher. **Furthermore, the output level is relatively unpredictable and, in the Northwest, is unlikely to be available at times of extreme peak load--for example when load is high because of a winter cold spell or a summer hot spell.**

Comment: If wind generation is not controllable, why is the Federal government subsidizing the wind industry? Why aren't we using our monies to work on conservation and raising efficiencies in the ways that we now use energy? If "the output level is relatively unpredictable and, in the Northwest, is unlikely to be available at times of extreme peak load…a winter cold spell or a summer hot spell" why are all these wind farms being built? Probably because they are highly subsidized by taxpayer money, and the producers get tax credits which they use for God knows what, but they are tax credits. Why are we spending so much money and effort on wind if it won't be available to cool us in summer and warm us in winter because wind is uncontrollable, variable, and unpredictable? These questions should be answered in the DEIS. There should be a rationale, by the proponents, as to why they are proponing for this wind

farm, and all the others in WA and OR and other areas. If wind is variable, then how is BPA going to balance the power generated by wind turbines? How is BPA going to maintain its flexibility and consistency of power production if wind is so variable, unpredictable, and uncontrollable? More questions that should be answered in the DEIS.

The amount of installed capacity expected to be available during peak-load hours is often called a generator's "peak contribution" or "reliable capacity." There is a body of technical literature on methods for the calculation of this value. **Analysis done by Bonneville and the Resource Adequacy Forum suggests that, for the wind area at the east end of the Columbia River Gorge, where much of the region's current wind generation is located, there is an inverse relationship between wind generation and extreme temperatures, both in winter and summer.** This is likely due to widespread high pressure zones covering the region's load centers (the biggest ones being west of the Cascades) and the area of wind generation east of the Cascades during periods of extreme low and extreme high temperatures. Figure 12-1 illustrates **the loss of wind generation during a recent winter period.** While efforts to better define the reliable capacity of wind generators are ongoing, both in the Northwest and in NERC and WECC, **the Resource Adequacy Forum has adopted a provisional peak contribution for wind of 5 percent of installed capacity.** This work will need to address the impact of future wind development in other areas, such as Montana and Wyoming, that may have different weather patterns and could improve the overall capacity contribution of wind.

Comment: So, analysis done by Bonneville and the Resource Adequacy Forum "...suggests that, for the wind area at the east end of the Columbia Gorge, where much of the region's current wind generation is located [as is the Whistling Ridge proposal] there is an inverse relationship between wind generation and extreme temperatures, both in winter and summer." Well, gosh darn, does this mean that when it's really hot, like in the summer time, there is less wind and therefore there is less wind power generation and therefore less energy is available for cooling? Summer time also means less water in the Columbia River and that means less water available to BPA for power generation. And, in the winter time, when it is really cold there is less wind power generation available to heat our homes and businesses? Why aren't these issues and concerns addressed in the DEIS? When we most need energy is when it is not being produced. Hmm, that does not make sense. Common sense, that is. Why are we even subsidizing more wind farms? Further, "the Resource Adequacy Forum has adopted a provisional peak contribution for wind of 5 percent of installed capacity." Does this mean that all the wind farms that litter the landscape only produce, and WILL ONLY PRODUCE and are ONLY CAPABLE OF PRODUCING, "5 percent of installed capacity"? This is a stunning statement. Whole ecosystems are being destroyed by wind turbines, pads, and impermeable maintenance roads that criss-cross our environments and ecosystems, and these wind farms will ONLY PRODUCE "5 percent of installed capacity"?!? Well, I would be speechless if this didn't make me so angry. This stunning analysis MUST be part of the DEIS and must be addressed in the future. A deep fatal flaw in this very inadequate, and getting more inadequate by the minute, DEIS.

Adding Flexible Capacity

System planners and operators are looking at resources that can be used to meet peak-hour demand and respond to **variations in wind output.** These flexible-duty resources do not necessarily need to generate large amounts of energy over the course of the year. **Resources typically placed in this category include: rapid-response natural gas-fired generators; storage resources such as pumped-storage hydro plants; and utility demand response programs.** ***In the near term, natural gas-fired turbines and reciprocating engines*** appear to be good options for meeting the increased demand for flexibility. To offset unexpected changes in wind output, these resources need rapid-start capability and efficient operation at output levels less than full capacity.

Comment: So, now we have come to the crux of the wind generation matter—wind is not a reliable source of energy and needs backup from "natural gas-fired generators; storage resources such as pumped-storage hydro plants; and utility demand response programs…natural gas-fired turbines and reciprocating engines appear to be good options." What is the carbon footprint of these backup systems? If I recall correctly, pumped-storage hydro plants are really reservoirs at high elevations to which water is pumped uphill, stored, and then released to go downhill and produce power through turbines. What are utility demand response programs? What are the cumulative regional impacts of these backup systems? These questions and issues should be addressed in the DEIS and are not. The DEIS is supposed to be a document that contains information so that we can all make reasoned, objective decisions about the proposed project and its regional cumulative effects. This DEIS is by no means that type of document.

The LM6000 Sprint (50-megawatt) and LMS100 (100-megawatt) aeroderivative turbines are two good candidates for flexibility augmentation. Starting cold, both turbines can be ramped to their maximum output within 10 minutes. These aeroderivative turbines are more efficient than comparable frame turbines, and therefore more cost-effective to operate at partial output levels. The LM6000 Sprint is a commercially mature technology with more than 200 units in operation. The first LMS100 unit went into commercial operation at the Groton Generating Station in South Dakota in 2006.

Comment: These "two good candidates for flexibility augmentation" sound good. But what is their carbon footprint? How do they affect the environment? Do they cause air pollution? Could we achieve better energy-saving results through conservation and increasing our efficiencies capabilities?

Gas-fired reciprocating engines are also a good flexibility option. The Plains End Generating Facility in Colorado is a 20-unit plant that has an output range of anywhere from 3 megawatts to 113 megawatts. The engines have a 10-minute quick start capability and can ramp up and down in response to an AGC signal. All of the above options can be constructed with short lead times, and therefore are good near-term flexibility options. A

more complete description of these natural gas-fired generating technologies is provided in Chapter 6.

Comment: Gas is a hydrocarbon. Hydrocarbon use produces greenhouse gasses. Greenhouse gasses are known to cause global climate changes. Using "gas-fired reciprocating engines" will produce greenhouse gasses. What is the carbon footprint of these gas-fired reciprocating engines? How many of them would be needed to balance out the unpredictability of wind power generation? What is their cumulative impact on air and water quality?

Pumped-storage hydro is a good mid-term option for meeting increased demand for flexibility since it can quickly change its operating level. These hydro plants operate in either a pumping mode or a generating mode. Traditional operation of pumped-storage hydro is based on the price of electric power. When the price of electric power is low, water is pumped from a source to a storage reservoir located at a higher elevation. When the price of electric power is high, the stored water is released and passed through a turbine to generate power. **As more wind power is added to the system, pumped-storage operation is likely to respond to the price of regulation and load-following services**. For example, operators of pumped-storage plants can commit in advance to increase pumping when there are unexpected increases in wind output. Plants with variable-speed pumps are likely to be more responsive in these circumstances. Likewise, operators can also commit to increase generation when wind power output unexpectedly drops. Furthermore, operating the plant in this manner is not likely to result in dramatic operating cost increases or reduced revenue. However, with a 13-year construction lead time, and high capital cost, risk is high. Other options may capture a large share of the ancillary services market before a new pumped-storage plant can be brought on-line.

Comment: Well, I don't want to burst anybody's bubble of happiness, but where are you all planning on getting the water that's necessary to produce pumped-storage hydro power? There is no chance on this green Earth that any water is coming out of the Columbia River. There are already too many users and abusers feasting on the Columbia. This is probably a non-starter idea. But, it should have been addressed in the DEIS. BPA's failure to do so is irresponsible.

The potential use of hot water heaters, plug-in hybrid vehicles, and other demand response options to provide regulation and load-following services is described in Chapter 5, Appendix H, and Appendix K."

Comment: The DEIS should have included a section on other ways and means of conserving and producing energy, as a contrast to wind power generation. BPA should more fully explain how our Pacific NW energy demands can be met by means other than wind power. They should also explain why this proposed wind farm is needed, or if it really is needed, in the energy grid.

Source document:
http://www.nwcouncil.org/energy/powerplan/6/final/SixthPowerPlan_Overview.pdf

/e-signature/**Mary J. Repar**
27August 2010

Michelle, Kayce (UTC)

From: Stephen Amy [redacted]
Sent: Friday, August 27, 2010 11:19 AM
To: EFSEC (UTC)
Subject: A comment on the proposed Whistling Ridge energy project

I am writing to submit a comment on the proposed Whistling Ridge energy project.

I believe wind power will be an essential and large part of the future mix of energy sources, and generally do support wind projects, but I also think that each site that has been proposed for a project must be evaluated according to local criteria.

I've heard that the Whistling Ridge project site is located in very important northern spotted owl habitat; and, considering the continuing decline of the spotted owls, this argues strongly against citing the project.

Also, a significant and large area of the Columbia Gorge National Scenic Area will have sightlines negatively affected if the project goes ahead.

Therefore, I ask that the State of Washington deny the proposal.

Stephen Amy
[redacted]

COMMENT LETTER 281

WR - DEIS
Public Comment #508

Michelle, Kayce (UTC)

From: repar [redacted]
Sent: Friday, August 27, 2010 12:02 PM
To: EFSEC (UTC)
Subject: Comments-Whistling Ridge-Land and Soils-Repar-6
Attachments: Comments_DEIS_Land_Soil_27Aug2010.doc

Importance: High

Dear EFSEC,
Attached, please find what I think is my last comment memo on the Whistling Ridge wind farm proposal! I wish you all Good Luck! in evaluating all the comments that you have and will be receiving. Thank you very much for all that you do to keep us and our environments safe./Mary

Mary J. Repar

[redacted]

Mary J. Repar
[redacted]

27 August 2010

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FAX: 503.230.3285
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www.bpa.gov/comment

Re: Regarding the inadequacy of analysis of impacts to land and soils from the proposed Whistling Ridge (WR) wind farm project in Skamania County, wind turbine size and weight, and geologic mass wasting, etc.

The Draft Environmental Impact Statement (DEIS) shows that the soils on the proposed Whistling Ridge wind farm site, 1152 acres located in Sections 5, 6, 7, 8, and 18 of T3N, R10E, and on Section 13 of T3N, R9E, are unstable and should not be disturbed through the building of this project, a project that would involve thousands of tons of ground movement and disturbance, with the addition of thousands of tons of concrete and wind turbines on top of this unstable soil. In reading the DEIS, it also came to my attention that the soil descriptions used by the proponent were not as complete and not as informative as the soil descriptions in the Soil Survey of Skamania County, Washington, done by the U.S. Department of Agriculture, Soil Conservation Service, dated October 1990. It is as if certain, very pertinent information was left out of the DEIS. I have attempted to put this information in this memo.

On p. 3-1, 3.1.1.2, Regional Geology, the DEIS states, *"Regional geologic maps indicate the presence of **Quaternary-age mass wasting landslide deposits located north of Underwood Mountain*** [my emphasis] *(Figure 3.1-2). These deposits are mapped as a large landslide, estimated to be approximately 1/3 square mile in area and almost a mile long. However, based on field work conducted in 2007, there is no obvious evidence to suggest the presence of a landslide as mapped on the 1:100,000 scale geologic map. If landslide deposits are present, they have been exposed long enough that most or all of the geomorphic evidence has been removed by erosion."* (p. 3-3) This is not an acceptable analysis. See Reference A, at the end of this document for more information on mass wasting but, briefly, "Mass wasting, the downhill movement of soil and rock under the influence of gravity, encompasses a variety of physical processes by which mountain ranges are eroded. These processes include:

- Creep - slow, nearly continuous downslope movement that is induced by either freeze/thaw cycles or wet/dry cycles.

- Slides - sudden downhill movement of masses of rock or sediment.
- Debris flows- dense, fluid mixtures of rock, sand, mud, and water

There are other categories of mass wasting processes such as slumps, rock flows, rockfalls, block glides (etc...) that can be grouped together or separately with creep, slides, and debris flows depending on which characteristics that share in common. **All of these processes share one thing in common, namely, that they are caused by the incessant downward pull of gravity, which moves loose slope material downwards."** [my emphasis]

"*These deposits are mapped as a large landslide, estimated to be approximately 1/3 square mile in area and almost a mile long. However, based on field work conducted in 2007, there is no obvious evidence to suggest the presence of a landslide as mapped on the 1:100,000 scale geologic map. If landslide deposits are present, they have been exposed long enough that most or all of the geomorphic evidence has been removed by erosion.*" "No obvious evidence...If landslide deposits are present...they have been exposed long enough that most or all of the geomorphic evidence has been removed..."!!! These are astonishing statements, made without any type of real, geological evidence, i.e., a sub-surface hazard survey, drill holes, etc., in the DEIS. **An in-depth geological study should be made of the entire proposed site—before the project is approved, not after.** Geomorphic evidence of landslides does not just disappear—a near-surface hazard survey is a tool to find out just what is going on under the exposed, eroded surface. This has not, apparently, been done for this DEIS, and it should be. This proposed wind farm would be situated on top of a unstable ridge line, subject to mass wasting[1].

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[1] References:

A. **http://www.geology.wisc.edu/courses/g112/mass_wasting.html**

I. Physical and chemical weathering

Weathering is the destructive process by which rocks and minerals are broken down through exposure to atmospheric agents such as air, wind, water, and ice. Weathering processes can be grouped into two broad categories, consisting of

Physical weathering - the fragmentation of a larger rock into smaller pieces by mechanical processes. These processes include

- abrasion (erosion of a rock due to the impact of grains carried by wind, water, or ice)
- fragmentation during downslope movement via rockfalls, landslides, etc.
- frost wedging via the freeze/thaw cycle.
- thermal expansion and contraction via heating and cooling

Chemical weathering - breakdown of rock or mineral through reactions between rocks/minerals and atmospheric constituents such as water, oxygen, and carbon dioxide. The most common reactions include

- Solution - molecules and elements in rocks and minerals dissolve directly into water
- Oxidation and hydration - reaction between oxygen, water, and iron-bearing minerals that helps to break down minerals
- Hydrolysis - a complex weathering reaction that forms clays, the primary constituent of soils.

Ice and Physical weathering

The two principal mechanisms by which ice causes rock weathering (and erosion) are via **frost wedging** and **glaciation.**

- **Frost wedging** is the process by which water that has trickled into cracks in rocks (ranging from microscopic to large cracks) alternates between freezing and thawing. Frozen water (ice) occupies 10% greater volume than does its liquid equivalent. Water that freezes thus pushes outward on the sides of a fracture with tremendous force. This eventually breaks rocks apart.

- **Glaciation** - Glaciers are large masses of ice that rest on or adjacent to a land surface and typically move. Glacial ice forms when snow accumulates in deep enough piles (tens of meters) to cause individual snow flakes to recrystallize and form ice. Glaciers are extremely effective weathering and erosional agents. A glacier is capable of carving deep valleys into bedrock as well as scraping all loose material (soil and weathered bedrock) off from a landscape. In alpine regions, mountain glaciers are important elements in both weathering and erosion; most alpine mountain peaks have been shaped (or carved) by small mountain glaciers.

II. Mass wasting and gravity

Mass wasting, the downhill movement of soil and rock under the influence of gravity, encompasses a variety of physical processes by which mountain ranges are eroded. These processes include

- Creep - slow, nearly continuous downslope movement that is induced by either freeze/thaw cycles or wet/dry cycles.
- Slides - sudden downhill movement of masses of rock or sediment.
- Debris flows- dense, fluid mixtures of rock, sand, mud, and water

There are other categories of mass wasting processes such as slumps, rock flows, rockfalls, block glides (etc...) that can be grouped together or separately with creep, slides, and debris flows depending on which characteristics that share in common. All of these processes share one thing in common, namely, that they are caused by the incessant downward pull of **gravity**, which moves loose slope material downwards.

Gravity-driven mass wasting processes are a subset of larger set of processes that transport weathered and unweathered earth materials. These processes are classified as **erosional processes**, which include all processes that remove and transport weathered or unweathered soil and rocks. Erosional processes include

- Wind
- Running water
- Waves
- Glaciers
- Water flowing underground
- Gravity-driven processes (mass-wasting)

Mass-wasting processes

Mass-wasting processes such as creep, landslides, and debris flows are distinguished from each other in part by whether they occur rapidly or slowly. Landslides are capable of transporting massive amounts of rock and soil downslope for miles in very short periods (e.g. minutes). Creep can also transport much material, but at rates of only millimeters per year. Both are important erosional processes. **Rapid mass**

p. 3-7, 3.1.1.4 Geologic Hazards

Earthquakes

Earthquakes are the result of sudden releases of built-up stress within the tectonic plates that make up the earth's surface. Stress accumulates where movement between plates or on faults produces friction. No faults are mapped within the footprint of the proposed project area. However, faults are mapped approximately 1.5 miles to the southwest and northeast. (Pezzopane 1993 and Geomatrix 1995) Many of these faults are inferred, and shown as dotted lines buried by younger surficial deposits. While the activity of the area faults is unknown, a review of aerial photography showed no indication of recent movement along the trace of the inferred faults.

There have been no surface-rupture earthquakes on any fault within northwestern Oregon or southwestern Washington in historic times, and investigations of the regional faults have been limited.

According to the updated National Seismic Hazard Maps published by the US Geological Survey (USGS) in 2008 (Petersen et al. 2008 and USGS 2009), the peak ground acceleration estimated for the area of the Whistling Ridge site is 0.18g for a 475-year return period earthquake (i.e., ground motion with a 10 percent chance of being exceeded in 50 years) and 0.40g for a 2,475year return period earthquake (i.e., ground motion with a 2 percent chance of being exceeded in 50 years).

Large earthquakes at more distant faults could cause prolonged ground movement at the project site. Information on historic large earthquakes can be found in the Application for Site Certification Section 3.1 (Appendix A).

Landslides

The landslide evaluation conducted for the Application for Site Certification concluded that the project could be constructed and operated without danger to human life or the surrounding environment due to landslide hazards.

Although none of the proposed turbines are located within Class II LHAs, several of the towers along the western side of the project site (Tower Lines A and B) are located along ridgelines with descending slopes that are locally greater than 35 degrees (70 percent). Based on studies conducted for the Application for Site Certification, it appears that the primary concern for towers located adjacent to the Class II LHAs is the potential for headward erosion of the steep drainages by debris or earth flow processes. Erosion rates of these drainages are unknown, but no obvious recent mass wasting features were observed in the aerial photos or during the site

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wasting events such as massive landslides or debris flows are typically triggered by events that destabilize material that resides on steep slopes. Such events include earthquakes, volcanic eruptions, rain or melting snow, and **poorly planned landscape alterations by humans (e.g. road cuts or developments that require the removal of material at the bases of slopes).** [my emphasis]

reconnaissance. **Further subsurface investigation in support of final tower foundation design would help determine if there are weak rock or soil layers that could contribute to more deep-seated failure of the ridges and provide information on the quality of the rock underlying the ridgelines.**

The soils on the proposed wind farm site can be found in the U.S. Department of Agriculture's Soil Conservation Service's Soil Survey of Skamania County Area, Washington, October 1990. The DEIS descriptions are in ITALICS; other descriptions and information for each soil type is from the Soil Survey book (I have copied freely!). The soil types are numbered, as follows:

#66, McElroy Series (included in this unit are small areas of Chemawa, Timberhead, Underwood, and Undusk soils) gravelly loam, 5 – 15 percent slopes. "*The McElroy series consists of very deep soils (up to 5 feet) formed in colluvium and residuum from basalt with a mantle of volcanic ash that influences soils in the top 9 to 13 inches. The soils exist on the footslopes and backslopes of mountains on slopes from 5 to 90 percent at elevations from 400 to 2,600 feet in eastern Skamania County and western Klickitat County. McElroy Soils are well drained with medium to rapid runoff and moderate permeability. The series was established in 1981 following the introduction of volcanic ash from the eruption of Mt. St. Helens.*" The average annual precipitation is 55 inches, average air temperature is about 46 degrees Fahrenheit (F), and the average frost-free period is 105 – 125 days. Hazard of water erosion is moderate. This unit is used for woodland, hayland, pastureland, homesites, wildlife habitat, and recreation. Douglas fir, ponderosa pine, and grand fir are the main woodland species. Oregon white oak and bigleaf maple are trees of limited extent in this soil unit. Main limitation for harvesting timber is seasonal soil wetness…wheeled and tracked equipment produces ruts, compacts the soil, and damages the roots of trees…Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet…Occasional snowpack hinders the use of equipment and limits access in winter. This unit is well suited to use as hayland and pastureland. The main limitation of this unit for use as homesites is the steepness of slop. Erosion is a hazard in the steeper areas. Capability sub-class IIIe.

#67, McElroy Series (included in this unit are small areas of Chemawa, Timberhead, Underwood, and Undusk soils), gravelly loam, 15 to 30 percent slopes. It formed in colluvium derived dominantly from basalt with a mantle of volcanic ash. The native vegetation is mixed conifers and shrubs. Elevation is from 400 to 2300 feet. [Note: the DEIS states that the McElroy Series is from 400 to 2600.] The average annual precipitation is 55 inches, average air temperature is about 46 degrees F, and the average frost-free period is 105 – 125 days. Runoff is medium and the hazard of water erosion is moderate. Most areas of this unit are used for woodland, pastureland, hayland, wildlife habitat, recreation, and **watershed.** A few areas are used as homesites. Douglas fir, ponderosa pine, and grand fir are the main woodland species on this unit. Limited extent trees are Oregon white oak and bigleaf maple. Main limitation for harvesting timber is seasonal soil wetness…wheeled and tracked equipment produces ruts, compacts the soil, and damages the roots of trees…Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet… Occasional snowpack hinders the use of equipment and limits access in winter, This unit is well suited to use as hayland and pastureland. The main limitations are steepness of slope and the hazard of erosion. Main limitation for use as homesites

is the steepness of slope and erosion. **Restricted permeability and steepness of slope increase the possibility of failure of septic tank absorption fields.** Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum. Capability subclass IVe.

Watersheds are very important and should be protected from industrial wind farms.

#68, McElroy Series (included in this unit are small areas of Chemawa, Timberhead, Underwood, and Undusk soils), gravelly loam, 30 – 65 percent slopes. Very deep, well-drained soil is on the back slopes of mountains. It formed in colluvium derived dominantly from basalt with a mantle of volcanic ash. The native vegetation is mainly mixed conifers and shrubs. Elevation is 400 to 2300 feet. The average annual precipitation is 55 inches, average air temperature is about 46 degrees F, and the average frost-free period is 105 – 125 days. **Runoff is rapid, and the hazard of water erosion is severe.** This unit is used for woodland, wildlife habitat, recreation, and **watershed**. Douglas fir, ponderosa pine, and grand fir are the main woodland species on this unit. Oregon white oak and bigleaf maple are limited extent trees on the unit. Steep slopes restrict the use of wheeled and tracked equipment in skidding. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Logging roads require suitable surfacing for year-round use. Occasional snowpack hinders the use of equipment and limits access in winter. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Capability sub-class VIe.

#135, Timberhead Series, gravelly loam, 5 to 30 percent slopes. *The Timberhead series consists of very deep soils (up to 5 feet) formed in residuum and colluvium from basalt mixed with volcanic ash. The **soils exist on mountain ridges between 5 and 30 percent at elevations from 2,000 to 3,600 feet in Skamania County and western Klickitat County.** Timberhead Series soils are well drained with medium to rapid runoff and moderately high to high permeability.* [Note: The Soil Survey book states that this unit is at 2000 to 2800 feet elevation.] Average annual precipitation is about 60 inches, the average annual air temp is 44 degrees F, and the average frost-free period is 95 to 115 days. Included in this unit are small areas of McElroy, Underwood, and Undusk soils. Runoff is medium, and the hazard of water erosion is moderate. Most areas of this unit are used for woodland, recreation, wildlife habitat, and watershed. A few areas are used as grazeable woodland. Douglas fir, grand fir, and western hemlock are the main woodland species on this unit. [Would there be bats here, just like at the canopy crane, because of the hemlock?] Among the trees of limited extent is western redcedar. Areas on ridge tops that are subject to **strong, persistent winds** [how strong and how persistent?] are less productive than other areas of this unit. The main limitation of harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and slippery and can be impassable when wet. Occasional snowpack hinder the use of equipment and limits access in winter. This map unit is in capability subclass IVe.

#136, Timberhead Series, gravelly loam, 30 to 65 percent slopes. *The Timberhead series consists of very deep soils (up to 5 feet) formed in residuum and colluvium from basalt mixed*

with volcanic ash. The soils exist on mountain ridges between 5 and 30 percent at elevations from 2,000 to 3,600 feet in Skamania County and western Klickitat County. Timberhead Series soils are well drained with medium to rapid runoff and moderately high to high permeability. [Note: the Soil Survey book states that this soil unit is in the 2000 to 2800 foot elevation range.] Average annual precipitation is about 60 inches, the average annual air temp is 44 degrees F, and the average frost-free period is 95 to 115 days. Included in this unit are small areas of McElroy, Underwood, and Undusk soils. Also included are small areas of Rock outcrop and moderately deep soils over basalt. Available water capacity is moderately high. **The hazard of water erosion is severe.** Most areas of this unit are used for woodland, recreation, wildlife habitat, and **watershed.** Douglas fir, grand fir, and western hemlock are the main woodland species on this unit. Western redcedar is a tree of limited extent. The main limitation for harvesting timber is steepness of slope, which restricts the use of wheeled and tracked equipment. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Occasional snowpack hinders the use of equipment and limits access in winter. Steep yarding paths, skid trails, and firebreaks, are subject to rilling and gullying unless plant cover is maintained or adequate water bars are provided. Capability subclass VIIe.

#144, Underwood loam, 2 to 15 percent slopes. *The Underwood series consists of very deep soils (5 feet or more) formed in residuum and colluvium from basalt and andesite with a thin mantle of volcanic ash. The soils exist on benches, backslopes, and footslopes of mountains with slopes between 2 and 50 percent at elevations between 500 and 2,700 feet in southeast Skamania County and west Klickitat County. Underwood Series soils are well drained with slow to medium runoff and moderately high permeability.* [Note: The Soil Survey book states that this unit is at 500 to 2000 feet elevation.] The native vegetation is mainly mixed conifers and shrubs. The average annual precipitation is about 50 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is 100 to 150 days. Included in this unit are small areas of Chemawa and McElroy soils on terraces and foot slopes and Timberhead and Undusk soils on ridgetops. Also included are small areas of soils that are more than 35 percent clay. Included areas make up about 10 percent of the total acreage. Permeability of this Underwood soil is moderately slow. **Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate.** This unit is used for woodland, hayland, pastureland, orchards, homesites, wildlife habitat, and recreation. Douglas fir, ponderosa pine, and grand fir are the main woodland species on this unit. Among the trees of limited extent are Oregon white oak and bigleaf maple. The main limitation for harvesting timber is seasonal soil wetness. **Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees.** Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. **Occasional snowpack hinders the use of equipment and limits access in winter.** The main limitations of this unit for use as homesites are steepness of slope, shrink-swell potential, moderately slow permeability, **and the hazard of erosion in the steeper areas.** Use of sandy backfill for the trench and long absorption lines helps to compensate for the moderately slow permeability of the soil. **During the rainy season, effluent from onsite sewage disposal systems may seep at points downslope.** If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage from onsite disposal systems. The effects of shrinking and swelling can be minimized by using proper engineering designs. **Buildings and roads should be designed to offset**

the limited ability of the soil in this unit to support a load. This map unit is in capability subclass IIIe.

#147, Undusk gravelly loam, 5 to 30 percent slopes. *The Undusk series consists of very deep soils (5 feet or more) formed in residuum and colluvium from basalt and andesite with a thin mantle of volcanic ash. The soils exist on benches, backslopes, and footslopes of mountains with slopes between 5 and 65 percent at elevations between 2,000 and 2,800 feet in southeast Skamania County and west Klickitat County. Undusk Series soils are well drained with slow to medium runoff and moderately high permeability.*
Based on the current test pits and field observations, the site soil is best represented as Soil Site Class D (stiff soils). Rock with varying strength and weathering characteristics was encountered at depths ranging from 3 to 12 feet bgs. The average annual precipitation is about 55 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is 90 to 120 days. The subsoil to a depth of 60 inches or more is dark brown very gravelly loam and extremely gravelly loam. Included in this unit are small areas of Chemawa, McElroy, Timberhead, and Underwood soils on ridges and back slopes and **St. Martin soils on landslides.** Also included are small areas of soils that are less than 35 percent rock fragments and soils that are shallow to bedrock. Included areas make up about 12 percent of the total acreage. Permeability of this Undusk soil is moderate. **Available water capacity is moderately high. Runoff is medium, and the hazard of water erosion is moderate.** This unit is used for woodland, wildlife habitat, recreation, and **watershed.** Douglas fir, grand fir, and western hemlock are the main woodland species on this unit. Among the trees of limited extent are red alder and western redcedar. **Areas on ridgetops that are subject to strong, persistent winds are less productive than other areas of this unit.** The main limitation for harvesting timber is seasonal soil wetness. Use of wheeled and tracked equipment when the soil is moist produces ruts, compacts the soil, and damages the roots of trees. Unsurfaced roads and skid trails are soft and can be impassable when wet. Logging roads require suitable surfacing for year-round use. **Occasional snowpack hinders the use of equipment and limits access in winter.** Logging activities can readily displace the surface layer. This map unit is in capability subclass IVe.

#177, Undefined Soil Unit located West of wind turbine string C1-C4. ??????

These units sit next to the turbine strings—????

Turbines are heavy, unwieldy machines. In my research, I came across the following information, several articles—one from Wind Watch, one from aweo.org, and one on transporting wind turbines--which provide insight on just how big and weighty wind turbines actually are, and I believe this information is very pertinent to the evaluation of weight effects on the soils located in the proposed area of the Whistling Ridge wind farm:

Article #1

http://www.wind-watch.org/faq-size-p.php

National Wind Watch

FAQ -- Size

How big is a wind turbine?

Industrial wind turbines are a lot bigger than ones you might see in a schoolyard or behind someone's house.

The widely used GE 1.5-megawatt model, for example, consists of 116-ft blades atop a 212-ft tower for a total height of 328 feet. The blades sweep a vertical airspace of just under an acre.

The 1.8-megawatt Vestas V90 from Denmark is also common. Its 148-ft blades (sweeping more than 1.5 acres) are on a 262-ft tower, totaling 410 feet.

Another model being seen more in the U.S. is the 2-megawatt Gamesa G87 from Spain, which sports 143-ft blades (just under 1.5 acres) on a 256-ft tower, totaling 399 feet.

Many existing models and new ones being introduced reach well over 400 feet high.

How are the wind turbine components transported?

Transport of such large items and the cranes needed to assemble them often presents problems in the remote areas where they are typically built. Roads must be widened, curves straightened, and in wild areas new roads built altogether.

What kind of platform is a wind turbine set in?

The steel tower is anchored in a platform of more than a thousand tons of concrete and steel rebar, 30 to 50 feet across and anywhere from 6 to 30 feet deep. Shafts are sometimes driven down farther to help anchor it. **Mountain tops must be blasted to accommodate it.** The platform is critical to stabilizing the immense weight of the turbine assembly.

How much do wind turbines weigh?

In the GE 1.5-megawatt model, the nacelle alone weighs more than 56 tons, the blade assembly weighs more than 36 tons, and the tower itself weighs about 71 tons -- a total weight of 164 tons. The corresponding weights for the Vestas V90 are 75, 40, and 152, total 267 tons; and for the Gamesa G87 72, 42, and 220, total 334 tons.

What is the nacelle?

The gearbox -- which transforms the slow turning of the blades to a faster rotor speed -- and the **generator are massive pieces of machinery housed in a bus-sized container**, called the nacelle, at the top of the tower. The blades are attached to the rotor hub at one end of the nacelle. **Some nacelles include a helicopter landing pad.**

Are wind turbines more intrusive than other structures of similar size?

Besides the noise and vibrations such huge moving machines unavoidably generate, they must be topped with flashing lights day and night to increase their visibility. The moving blades attract attention.

How much area is required for a wind power facility?

The **huge turbines require a correspondingly large area around them clear of trees and other turbines** to maximize the effect of the wind and avoid interference. **They should have 10 rotor diameters of clearance in the direction of the wind and 3 rotor diameters in every other direction.** In a line of several turbines perpendicular to the wind **(as on a mountain ridge),** the **GE 1.5-MW model would need at least 32 acres and the Vestas V90 78 acres for each tower.** In an array that can take advantage of the wind from any direction, the GE needs 82 acres and the Vestas V90 111 acres per tower.

In practice, the area varies, averaging about 50 acres per megawatt of capacity. On mountain ridges, the turbines are generally squeezed in about eight per mile.

Can the area around a wind turbine continue to be used?

Only by putting oneself in danger. Besides the **unpleasant noises and distracting motion, wind turbines are not safe.** They are **high-voltage electrical devices with large moving parts. It is estimated that for every 100 turbines, one blade will break off (see Larwood, 2005).** In the winter, heavy sheets of ice can build up and then fall or be thrown off. Access to the land around wind turbines is usually restricted, even to the landowner.

Are bigger turbines more efficient?

No, they are just **bigger.** Output depends on wind speed and the combination of blade diameter and generator size. **Bigger blades on a taller tower can capture more wind to run a bigger generator, but they don't do so more efficiently than smaller models.**

Article #2

http://www.aweo.org/windmodels.html
Size specifications of common industrial wind turbines

Vestas and General Electric (GE) dominate the market for industrial wind turbines in the U.S. Many older U.S. facilities use NEG Micon turbines, and Vestas has absorbed that manufacturer. Other older facilities use turbines from Zond, which was acquired by Enron (the inventor of "green tags"), whose wind business GE acquired in turn to take over the racket. Information about Vestas models can be found at www.vestas.com, Gamesa models at www.gamesa.es/en/products/wind-turbines/catalogue, GE models at www.gepower.com/prod_serv/products/wind_turbines/en, Siemens models at www.powergeneration.siemens.com/products-solutions-services/products-packages/wind-turbines/products/Products.htm, Suzlon models at www.suzlon.com, Clipper models at www.clipperwind.com, and Repower (acquired by Suzlon in May 2007) models at www.repower.de/index.php?id=12&L=1. Americas Wind Energy, Enercon, Fuhrländer, Mitsubishi, Goldwind, Nordex, AAER, Dewind, and Ecotècnia are also major manufacturers, but their turbines are less common in the U.S.

model	capacity	blade length*	hub ht†	total ht	area swept by blades	rpm range	max blade tip speed‡	rated wind speed§
GE 1.5s	1.5 MW	35.25 m (116 ft)	64.7 m (212 ft)	99.95 m (328 ft)	3,904 m² (0.96 acre)	11.1-22.2	183 mph	12 m/s (27 mph)
GE 1.5sle	1.5 MW	38.5 m (126 ft)	80 m (262 ft)	118.5 m (389 ft)	4,657 m² (1.15 acre)	?	?	14 m/s (31 mph)
Vestas V82	1.65 MW	41 m (135 ft)	70 m (230 ft)	111 m (364 ft)	5,281 m² (1.30 acres)	?-14.4	138 mph	13 m/s (29 mph)
Vestas V90	1.8 MW	45 m (148 ft)	80 m (262 ft)	125 m (410 ft)	6,362 m² (1.57 acres)	8.8-14.9	157 mph	11 m/s (25 mph)
			105 m (344 ft)	150 m (492 ft)				
Vestas V100	2.75 MW	50 m (164 ft)	80 m (262 ft)	130 m (427 ft)	7,854 m² (1.94 acres)	7.2-15.3	179 mph	15 m/s (34 mph)
			100 m (328 ft)	150 m (492 ft)				
Vestas V90	3.0 MW	45 m	80 m	125 m	6,362 m²	9-19	200 mph	15 m/s

		(148 ft)	(262 ft)	(410 ft)	(1.57 acres)			(34 mph)
Gamesa G87	2.0 MW	43.5 m (143 ft)	78 m (256 ft)	121.5 m (399 ft)	5,945 m² (1.47 acres)	9/19	194 mph	c. 13.5 m/s (30 mph)
Siemens	2.3 MW	46.5 m (153 ft)	80 m (262 ft)	126.5 m (415 ft)	6,793 m² (1.68 acres)	6-16	169 mph	13-14 m/s (29-31 mph)
Bonus (Siemens)	1.3 MW	31 m (102 ft)	68 m (223 ft)	99 m (325 ft)	3,019 m² (0.75 acres)	13/19	138 mph	14 m/s (31 mph)
Bonus (Siemens)	2.0 MW	38 m (125 ft)	60 m (197 ft)	98 m (322 ft)	4,536 m² (1.12 acres)	11/17	151 mph	c. 15 m/s (c. 34 mph)
Bonus (Siemens)	2.3 MW	41.2 m (135 ft)	80 m (262 ft)	121.2 m (398 ft)	5,333 m² (1.32 acres)	11/17	164 mph	c. 15 m/s (c. 34 mph)
Suzlon 950	0.95 MW	32 m (105 ft)	65 m (213 ft)	97 m (318 ft)	3,217 m² (0.79 acres)	13.9/20.8	156 mph	11 m/s (25 mph)
Suzlon S64	1.25 MW	32 m (105 ft)	73 m (240 ft)	105 m (344 ft)	3,217 m² (0.79 acres)	13.9/20.8	156 mph	12 m/s (27 mph)
Suzlon S88	2.1 MW	44 m (144 ft)	80 m (262 ft)	124 m (407 ft)	6,082 m² (1.50 acres)			14 m/s (31 mph)
Clipper Liberty	2.5 MW (4 × 650 KW)	44.5 m (146 ft)	80 m (262 ft)	124.5 m (409 ft)	6,221 m² (1.54 acres)	9.7-15.5	163 mph	c. 11.5 m/s (c. 26 mph)
		46.5 m (153 ft)		126.5 m (415 ft)	6,793 m² (1.68 acres)		169 mph	
		49.5 m (162 ft)	78 m (256 ft)	127.5 m (418 ft)	7,698 m² (1.90 acres)		180 mph	
Repower MM92	2.0 MW	46.25 m (152 ft)	100 m (328 ft)	146.25 m (480 ft)	6,720 m² (1.66 acres)	7.8-15.0	163 mph	11.2 m/s (25 mph)

*This figure is actually half the rotor diameter. The blade itself may be about a meter shorter, because it is attached to a large hub.

†Hub (tower) heights may vary; the more commonly used sizes are presented.
‡Rotor diameter (m) × π × rpm ÷ 26.82
§The rated, or nominal, wind speed is the speed at which the turbine produces power at its full capacity. For example the GE 1.5s does not generate 1.5 MW of power until the wind is blowing steadily at 27 mph or more. As the wind falls below that, power production falls exponentially.

Article #3

http://www.cn.ca/documents/WhitePapers/Transporting-Wind-Turbines-White-Paper-en.pdf
HOW BIG IS BIG?

To understand and appreciate the logistics of transporting such massive parts it helps to understand the makeup of a wind turbine. The specs for a 1.8 MW turbine provided by the Canadian Wind Energy Association (CanWEA):

- **The nacelle (generator components)** is the size of a small motor home and weighs 63,000 kg (138,891 lb).
- **Each blade** is 39 m (128 ') long – the same length as a Boeing 737, and the 3-blade rotor weighs 35,000 kg (77,162 lb).
- **The 65 m (213 ') tower** is made up of rolled steel and comes in three pieces. The entire tower weighs 132,000 kg and contains enough steel to manufacture 206 average cars.
- **The foundation concrete** is 9 – 10 m (33 ') deep and 4 m (13 ') across. 102 tension type bolts run the full depth of the foundation.
- **Swept area** of the blades is 5,024 sq. m, (16,483 ') the size of 3 NHL hockey rinks combined or about 1.25 acres.
- **Total weight** of the entire turbine is 230,000 kg (507,063 lb) – about the same as two fully fueled 3,200 HP diesel electric locomotives.

This is just one example, however even the wind turbine components above are often even bigger than this.

WWW.CN.CA 4 **THE LOGISTICS, NOT EXACTLY A BREEZE**

Understanding the size of wind turbines provides an appreciation for the complexity of their transportation. A single turbine can require up to 8 loads (one nacelle, one hub, three blades and three tower sections). **For an entire project of 150 MW, transportation requirements have been as much as 689 truckloads, 140 railcars and 8 vessels to the United States.** And, many projects today are much larger than 150 MW (the largest operating project in the US is currently 736 MW, and projects of more than 4,000 MWs are in the early stages of development).5

It is no wonder that one of the biggest challenges facing the industry are the logistics of transporting such oversized parts sometimes over extremely long distances. **Among the issues; traffic backups, road damage, coordination and cost.**

TRAFFIC CONGESTION

As suggested in a recent article in the New York Times, *"As demand for clean energy grows, towns around the country are finding their traffic patterns roiled as convoys carrying disassembled towers that will reach more than 250 feet (*76.2 m) *in height, as well as motors, blades and other parts roll through. Escorted by patrol cars and gawked at by pedestrians, the equipment must often travel hundreds of miles from ports or factories to the remote, windy destinations where the turbines are erected."6*

ROAD DAMAGE

Normal wear and tear of any road is expected over time, but **whenever there is extensive pressure and constant flow of traffic, road damage becomes inevitable.** In Texas for example, the state with the most wind turbines, the **constant truck traffic is tearing up small roads** in the western part of the state, where the turbines are being rapidly erected.

Conclusions and Comments:

1. **An in-depth geological study should be made of the entire proposed site—before the project is approved, not after. A near-surface seismic hazard survey and deep coring should be required before this project is approved.**

2. **No watershed studies have been done for this project site, even though the Soil Surveys clearly state that this is a watershed area.**

3. **The impacts of the turbines' weights on the mountain ridges in the DEIS has not been fully addressed. Could mass wasting result from ridges being flattened, heavy machinery being installed, deep anchors disturbing the soils, etc?**

4. **"The steel tower is anchored in a platform of more than a thousand tons of concrete and steel rebar,** 30 to 50 feet across and anywhere from 6 to 30 feet deep. Shafts are sometimes driven down farther to help anchor it. **Mountain tops must be blasted to accommodate it.** The platform is critical to stabilizing the immense weight of the turbine assembly." This statement is from the National Windwatch article. I really don't want to see mountain tops "blasted," and residents near the wind farm proposal probably don't want to see it, either! The proposed wind farm has 50 some turbines proposed. That is 50 x 1000 tons of concrete and steel rebar = to 50,000 tons of concrete and steel rebar weighing down on soils that are susceptible to erosion; one ton equals 2000 pounds, 2000 pounds x 50,000 tons = 50,000,000 pounds. What are the cumulative impacts of putting 50,000,000 pounds of stress on mountain ridges in Skamania County, and what are the cumulative effects of all the other wind farms' weights on all the lands and soils in BPA's area of interest? What does all this weight do to water tables? Any other effects? This issue of weight should be addressed more fully in the DEIS and its lack makes the DEIS inadequate and incomplete.

5. Wind turbines are dangerous pieces of noisy machinery and they should not be put on top of ridges or on steep slopes. At least this is what I think. The lack of information on the environmental, cumulative impacts of wind turbines on lands and soils is a critical deficiency in the Whistling Ridge DEIS and this is a fatal flaw in the DEIS.

6. Mass wasting is a real concern in the proposal area and it has not been adequately addressed in the DEIS. There are real consequences to area residents from erosion and mass wasting events. How would people be evacuated if a wind turbine's weight causes a mass wasting event or other types of erosion? What are the evacuation routes?

There are a lot of questions about the geology of the proposal area that have not been adequately answered in the DEIS. We need complete data in order to properly evaluate the DEIS.

/e-signature/**Mary J. Repar**
27 August 2010