

South Dakota Public Utilities Commission

EL19-003 - In the Matter of the Application by Crowned Ridge Wind, LLC for a Permit of a Wind Energy Facility in Grant and Codington Counties – Evidentiary Hearing

June 12, 2019, 8:30 a.m.

Room 413 – Capitol Building, 500 E. Capitol Ave., Pierre, S.D.

Please Print Legibly

Full Name	City/State
DAVID GANJE	SanCity Az
Al Robish	Strandburg SD
KilMe	Twin Brooks SD
Perry Oberg	Juno Beach. FL.
Mark Thompson	Juno Beach .FL.
Daryl Hart	Juno Beach FL
Brittany Bruce	Juno Beach, FL
Miles Schumacher	Sparks Fork SD
Richard Langdon	Maynard, MA
Jay Haleg	Grand Forks, ND
Christopher Olson	Ancaster, ON, CANADA
Robert McConno	Boston, MA.
Amber Christenson	Strandburg SD
Brian Murphy	Juno Beach FL
Jillian Still	Juno Beach FL
Sam Massey	Juno Beach, FL
Tyler Wilhelm	Juno Beach, FL
Sarah Sappington	Bismarck, ND
Patrick Lynch	Waverly, SD

South Dakota Public Utilities Commission

EL19-003 - In the Matter of the Application by Crowned Ridge Wind, LLC for a Permit of a Wind Energy Facility in Grant and Codington Counties – Evidentiary Hearing

June 12, 2019, 8:30 a.m.

Room 413 – Capitol Building, 500 E. Capitol Ave., Pierre, S.D.

Please Print Legibly

Full Name

City/State

Raige Olson

Pierre, SD

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

= = = = =

IN THE MATTER OF THE APPLICATION
BY CROWNED RIDGE WIND II, LLC FOR
A PERMIT OF A WIND ENERGY FACILITY
IN GRANT AND CODINGTON COUNTIES

EL19-003
ORIGINAL

= = = = =

Transcript of Proceeding
June 12, 2019
8:30 a.m.
Volume III, Pages 328-585

= = = = =

BEFORE THE PUBLIC UTILITIES COMMISSION,
GARY HANSON, CHAIRMAN
CHRIS NELSON, VICE CHAIRMAN
KRISTIE FIEGEN, COMMISSIONER

COMMISSION STAFF

Karen Cremer
Greg Rislov
Adam de Hueck
Darren Kearney
Kaitlyn Baucom

A P P E A R A N C E S

Miles Schumacher and Brian Murphy,
appearing on behalf of Crowned Ridge Wind II;

David Ganje,
appearing on behalf of the Intervenor;

Kristen Edwards and Mikal Hanson,
appearing on behalf of Staff.

Reported By Cheri McComsey Wittler, RPR, CRR
Precision Reporting, 213 S. Main, Onida, South Dakota
cwittler@venturecomm.net

1 The following transcript of proceedings was
2 held in the above-entitled matter at the South Dakota
3 State Capitol, 500 East Capitol Avenue, Pierre,
4 South Dakota, on the 12th day of June, 2019, commencing
5 at 8:30 a.m.

6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

I N D E X

1		
2	STAFF WITNESS	PAGE
3	DAVID HESSLER	
4	Direct Examination by Mr. Mikal Hanson	19
	Cross-Examination by Mr. Murphy	41
5	Cross-Examination by Mr. Ganje	57
	Commissioner Questions	98
6	Redirect Examination by Mr. Mikal Hanson	106
7	APPLICANT WITNESSES	PAGE
8	ANDREW BAKER	
9	Direct Examination by Mr. Schumacher	133
	Cross-Examination by Mr. Ganje	136
10	Cross-Examination by Ms. Edwards	142
	Commissioner Questions	144
11	Redirect Examination by Mr. Schumacher	153
	Recross-Examination by Mr. Ganje	154
12	Recross-Examination by Ms. Edwards	158
13	SARAH SAPPINGTON	
14	Direct Examination by Mr. Schumacher	168
	Cross-Examination by Mr. Ganje	174
15	Cross-Examination by Mr. Mikal Hanson	188
	Commissioner Questions	202
16	Redirect Examination by Mr. Schumacher	215
	Recross-Examination by Mr. Mikal Hanson	217
17		
18	TYLER WILHELM	
	Direct Examination by Mr. Murphy	221
19	Cross-Examination by Mr. Ganje	232
	Cross-Examination by Ms. Edwards	250
20	Commissioner Questions	257
	Redirect Examination by Mr. Murphy	270
21	Recross-Examination by Mr. Ganje	271
	Recross-Examination by Ms. Edwards	275
22		
23		
24		
25		

1	<u>I N D E X (Continued)</u>	
2	APPLICANT WITNESSES	PAGE
3	SAM MASSEY	
4	Direct Examination by Mr. Murphy	278
	Cross-Examination by Mr. Ganje	281
5	Cross-Examination by Ms. Edwards	286
	Commissioner Questions	292
6	Recross-Examination by Ms. Edwards	296
7	MARK THOMPSON	
8	Direct Examination by Mr. Murphy	299
	Cross-Examination by Mr. Ganje	301
9	Cross-Examination by Ms. Edwards	308
	Commissioner Questions	310
10	JAY HALEY	
11	Direct Examination by Mr. Schumacher	342
12	Cross-Examination by Mr. Ganje	372
	Cross-Examination by Mr. Mikal Hanson	375
13	Commissioner Questions	384
	Redirect Examination by Mr. Schumacher	402
14	Recross-Examination by Mr. Ganje	404
15	RICH LAMPETER	
16	Direct Examination by Mr. Schumacher	415
	Cross-Examination by Mr. Mikal Hanson	418
17	Commissioner Questions	422
	Recross-Examination by Mr. Mikal Hanson	431
18	DR. ROBERT MCCUNNEY	
19	Direct Examination by Mr. Murphy	432
20	Cross-Examination by Ms. Edwards	436
	Commissioner Questions	438
21	Recross-Examination by Ms. Edwards	447
22	DR. CHRISTOPHER OLLSON	
23	Direct Examination by Mr. Murphy	450
	Cross-Examination by Mr. Ganje	458
24	Cross-Examination by Mr. Mikal Hanson	483
	Commissioner Questions	485
25		

1	<u>I N D E X (Continued)</u>	
2	PUC STAFF WITNESSES	PAGE
3	TOM KIRSCHENMANN	
4	Direct Examination by Mr. Mikal Hanson	497
	Cross-Examination by Mr. Schumacher	512
5	Cross-Examination by Mr. Ganje	513
	Commissioner Questions	518
6	Redirect Examination by Mr. Mikal Hanson	538
7	PAIGE OLSON	
8	Direct Examination by Ms. Edwards	541
	Cross-Examination by Mr. Ganje	544
9	Commissioner Questions	548
	Redirect Examination by Ms. Edwards	550
10	Recross-Examination by Mr. Schumacher	551
11	DARREN KEARNEY	
12	Direct Examination by Ms. Edwards	552
	Cross-Examination by Mr. Ganje	557
13	Commissioner Questions	562
	Redirect Examination by Ms. Edwards	572
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

I N D E X (Continued)

APPLICANT EXHIBITS

A1	Crowned Ridge Application
A1-A	Appendix A - Figures
A1-B	Appendix B - Agency Coordination Dates and and Correspondence
A1-C	Appendix C - Dakota Skipper and Poweshiek Skipperling Survey Report
A1-D	Appendix D - '17-18 Raptor Nest Survey Report
A1-E	Appendix E - Avian Use Survey Report
A1-F	Appendix F - Bat Habitat Assessment Report
A1-G	Appendix G - Bat Acoustic Survey Report
A1-H	Appendix H - Sound Level Modeling Report
A1-I	Appendix I - Shadow Flicker Modeling Report
A1-J	Appendix J - County Conditional Use Permits
A1-K	Appendix K - Property Value Effect Studies
A1-L	Appendix L - Decommissioning Plan
A1-M	Appendix M - Telecommunication Studies
A2	Jay Haley Direct Testimony
A3	Kimberly Wells Direct Testimony
A4	Mark Thompson Direct Testimony
A5	Tyler Wilhelm and Sam Massey Direct and Exhibits
A6	Supplemental Figure 3a
A7	Responses to PUC Staff's First Set of DR's
A7-1	Attachment to DR 1-1
A7-2	Attachment 2 to DR 1-7 Confidential
A7-3	Attachment 1 to DR 1-13 Confidential
A7-4	Attachment 1 to DR 1-7 Confidential
A7-5	Attachment 1 to DR 1-9 Confidential
A7-6	Attachment to DR 1-10
A8	EAPC Wind Energy's Letter and Updated Appendices A through D for Appendix H
A9	EAPC Wind Energy's Letter and Updated Appendices A through D for Appendix I
A10	EAPC Wind Energy's Letter and Updated Landowner Participation Status for Appendix H
A11	EAPC Wind Energy's Letter and Updated Landowner Participation Status for Appendix I
A12	US Fish & Wildlife Service's Letter regarding Environmental Comments
A13	US Fish & Wildlife Service's Memo regarding Region 6 guidance for Minimizing Effects from Power Line Projects within the Whooping Crane Migration Corridor

I N D E X (Continued)

APPLICANT EXHIBITS

1	A14	US Fish & Wildlife Service, Region 6
2		Mountain-Prairie Region's Outline for a Bird
3		and Bat Conservation Strategy: Wind Energy
4		Projects
5	A15	2013 US Fish & Wildlife Service's Revised
6		Voluntary Guidelines for Communication Tower
7		Design, Siting, Construction, Operation,
8		Retrofitting, and Decommissioning
9	A16	Responses to PUC Staff's Second Set of DR's
10	A16-1	Attachment 1 to 2-30 Confidential
11	A16-2	Attachment 1 to 2-15
12	A16-3	Attachment 1 to 2-8
13	A16-4	Attachment 1 to 2-13
14	A17	Supplement to 1-11; Appendixes A, B & D
15	A18	Supplement to 1-12; Appendixes B & D
16	A19	Responses to PUC Staff's Second Set of DR's
17	A20	Responses to Amber Christenson and Kristi
18		Mogen's First Set of DR's
19	A20-1	Attachment 1 to 1-6
20	A20-2	Attachment 1 to 1-8
21	A20-3	Attachment 1 to 1-9
22	A20-4	Attachment 1 to 1-10
23	A20-5	Attachment 1 to 1-11
24	A20-6	Attachment 1 to 1-12
25	A20-7	Attachment 1 to 1-13
	A20-8	Attachment 1 to 1-17
	A20-9	Attachment 1 to 1-18
	A20-10	Attachment 1 to 1-20
	A20-11	Attachment 1 to 1-22
	A20-12	Attachment 1 to 1-23
	A20-13	Attachment 1 to 1-46
	A20-14	Attachment 1 to 1-152 - Applicant's Responses
		to Staff
	A20-15	Attachment 1 to 2-8
	A20-16	Attachment 1 to 2-13
	A20-17	Attachment 1 to 2-15
	A20-18	Supplement to 1-12; Appendix E
	A20-19	Supplement to 1-12; Appendix F
	A20-20	Supplement to 1-12; Appendix H
	A21	Supplemental Testimony of Mark Thompson
	A22	Supplemental Testimony of Jay Haley
	A22-1	Exhibit 1 - Supplemental Material that
		Updates Sound Study to Reflect Landowner
		Participation Status

I N D E X (Continued)

APPLICANT EXHIBITS

- | | | |
|----|--------|--|
| 1 | A22-2 | Exhibit 2 - Tables: Crowned Ridge Sound Level |
| 2 | A22-3 | Exhibit 3 - Supplemental Material that |
| 3 | A23 | Updates Shadow Flicker Study to Reflect |
| 4 | A24 | Landowner Participation Status |
| 5 | A24-1 | Tyler Wilhelm and Sam Massey Supplemental |
| 6 | A24-2 | Christopher Ollson Supplemental |
| 7 | A24-3 | Exhibit 1 - Christopher Ollson CV |
| 8 | A24-4 | Exhibit 2 - "Health Effects and Wind |
| 9 | A24-5 | Turbines: A Review of the Literature" |
| 10 | A24-6 | Exhibit 3 - "Effects of Wind Turbine Noise on |
| 11 | A24-7 | Self-Reported & Objective Measures of Sleep" |
| 12 | A24-8 | Exhibit 4 - "Impact of Wind Turbine Sound on |
| 13 | A24-9 | Annoyance, Self-Reported Sleep Disturbance |
| 14 | A24-10 | and Psychological Distress" |
| 15 | A24-11 | Exhibit 5 - "Before-After Field Study of |
| 16 | A24-12 | Effects of Wind Turbine Noise on |
| 17 | A24-13 | Polysomnographic Sleep Parameters" |
| 18 | A24-14 | Exhibit 6 - "Health-based Audible Noise |
| 19 | A24-15 | Guidelines Account for Infrasound and |
| 20 | A24-16 | Low-Frequency Noise Produced by Wind Turbines" |
| 21 | A24-17 | Exhibit 7 - "Measurement and Level of |
| 22 | A24-18 | Infrasound from Wind Farms and Other Sources" |
| 23 | A24-19 | Exhibit 8 - "Wind Turbines and Health, A |
| 24 | A24-20 | Critical Review of the Scientific Literature" |
| 25 | A24-21 | Exhibit 9 - "Low-frequency Noise Including |
| | A24-22 | Infrasound From Wind Turbines & Other Sources" |
| | A24-23 | Exhibit 10 - "Wind Turbines and Human Health" |
| | A24-24 | Exhibit 11 - "Exposure to Wind Turbine Noise: |
| | A24-25 | Perceptual Responses and Reported Health |
| | A24-26 | Effects" |
| | A24-27 | Exhibit 12 - "Estimating Annoyance to |
| | A24-28 | Calculated Wind Turbine Shadow Flicker is |
| | A24-29 | Improved When Variables Associated with Wind |
| | A24-30 | Turbine Noise Exposure are Considered" |
| | A24-31 | Exhibit 13 - "Notes on the Identification and |
| | A24-32 | Evaluation of Optical Emissions from Wind |
| | A24-33 | Turbines" |
| | A24-34 | Exhibit 13 - "Notes on the Identification and |
| | A24-35 | Evaluation of Optical Emissions from Wind |
| | A24-36 | Turbines" (in English) |
| | A24-37 | Exhibit 14 - "Wind Turbines and Photosensitive |
| | A24-38 | Epilepsy" |
| | A24-39 | Exhibit 15 - "Wind Turbines Flicker and |
| | A24-40 | Photosensitive Epilepsy" |

I N D E X (Continued)

APPLICANT EXHIBITS

1	A24-16	Exhibit 16 - "Potential of Wind Turbines to Elicit Seizures Under Various Meteorological Conditions"
2	A24-17	Exhibit 17 - "Update of UK Shadow Flicker Evidence Base"
3	A25	Kimberly Wells Direct Testimony adopted by Sarah Sappington
4	A26	Responses to PUC Staff's Third Set of DR's
5	A26-1	Attachment 1 to 3-2 Confidential
6	A26-2	Attachment 1 to 3-5
7	A26-3	Attachment 1 to 3-10
8	A27	Responses to PUC Staff's Fourth Set of DR's
9	A28	Letter regarding Allocation of Tax Revenues
10	A29	Amendment to the Application Crowned Ridge
11	A30	Letter regarding Kimberly Wells
12	A31	Supplemental Responses to PUC Staff's First Set of DR's
13	A31-1	Attachment - Notice of Entry of Findings of Fact
14	A32	Responses to PUC Staff's Fifth Set of DR's
15	A32-1	Attachment to Staff 5-1 Confidential
16	A32-2	Attachment 1 - Figure 3
17	A33	Applicant's Responses to Intervenor's Third Set
18	A34	Applicant's Responses to Intervenor's Second Set
19	A35	PUC Letter Forward Updated Maps
20	A35-1	Revised Figure 2 - Public Land and Facilities
21	A35-2	Revised Figure 3 - Project Map
22	A35-3	Revised Figure 3a - Project Map
23	A35-4	Revised Figure 6 - Environmental Constraints
24	A35-5	Revised Figure 7 - Constraints Map
25	A35-6	Revised Figure 8 - Topographic Map
	A35-7	Revised Figure 9a - Surficial Geology
	A35-8	Revised Figure 9b - Geology Cross-sections
	A35-9	Revised Figure 10 - Bedrock Geology
	A35-10	Revised Figure 11 - Soil Types
	A35-11	Revised Figure 12 - Water Resources
	A35-12	Revised Figure 13 - Land Use
	A36	Supplemental Responses to PUC Staff's DR 2-41
	A37	Rebuttal Testimony of Mark Thompson
	A37-1	GE Power and Water - Original - Technical Documentation Wind Turbine Generator Systems 1 & 2MW Platform - 50/60 Hz A37-2 Confidential
	A37-2	Applicant's Response to Staff DR 5-2

I N D E X (Continued)

APPLICANT EXHIBITS

- A37-3 GE Recommendation "Setback Consideration
Generic xxHz EN r04"
- A38 Chris Ollson Rebuttal Testimony
- A38-1 Noise Annoyance in Canada
- A38-2 UK National Noise Attitude Survey 1999/2000
- A38-3 The Association Between Self-Reported and
Objective Measures of Health and Aggregate
Annoyance Scores Toward Wind Turbine
Installations
- A38-4 Ann Assessment of Quality of Life Using the
WHOQOL-BREF Among Participants Living in the
Vicinity of Wind Turbines
- A38-5 The Effects of Environment and Classroom Noise
on the Academic Attainments of Primary School
Children
- A38-6 Low-Frequency Noise Incl. Infrasound from Wind
Turbines and Other Sources
- A38-7 The Pattern of Complaints about Australian
Wind Farms Does Not Match the Establishment
and Distribution of Turbines: Support for the
Psychogenic, 'Communicated Disease Hypothesis
- A39 Andrew Baker Rebuttal Testimony
- A39-1 Qualifications
- A39-2 Valbridge Property Advisors Value Impact Study
- A39-3 The Windy City: Property Value Impacts of Wind
Turbines in an Urban Setting
- A40 Dr. Robert McCunney Rebuttal Testimony
- A40-1 Curriculum Vitae
- A40-2 Guidelines for the Diagnosis and Management of
Asthma
- A40-3 The Scope for Biased Recall of Risk-Factor
Exposure in Case-Control Studies: Evidence
from a Cohort Study of Scottish Men
- A40-4 The Placebo and Nocebo Phenomena: Their
Clinical Management and Impact on Treatment
Outcomes
- A40-5 Nocebo Effect of Informed Consent in
Interventional Procedures
- A40-6 The Nocebo Effect in the Context of Statin
Intolerance
- A40-7 Fright Factors About Wind Turbines and Health
in Ontario Newspapers Before and After the
Green Energy Act

I N D E X (Continued)

APPLICANT EXHIBITS

3	A40-8	The Pattern of Complaints about Australian
4		Wind Farms Does Not Match the Establishment
5	A40-9	and Distribution of Turbines: Support for the
6		Psychogenic, 'Communicated Disease' Hypothesis
7	A41	Can Road Traffic Mask Sound from Wind
8	A41-1	Turbines? Response to Wind Turbine Sound at
9	A41-2	Different Levels of Road Traffic Sound
10	A41-3	Richard Lampeter Rebuttal Testimony
11	A41-4	Curriculum Vitae
12		Wind Turbine Health Impact Study: Report of
13		Independent Expert Panel - January 2012
14	A41-3	Assessing Sound Emissions from Proposed Wind
15		Farms and Measuring the Performance of
16		Completed Projects
17	A41-4	Noise Control Engineering Journal
18	A42	March-April 2011
19	A42-1	Sarah Sappington Rebuttal Testimony
20	A43	Maps
21	A43-1	Jay Haley Rebuttal Testimony
22	A43-2	Crowned Ridge Wind Farm Shadow Flicker Iso -
23		Lines Overview Map
24	A43-3	Crowned Ridge Wind Farm Sound Pressure Iso -
25		Lines Overview Map
	A43-4	Crowned Ridge Sound Level Tabular Results
		Sorted by Sound Level Realistic
	A43-5	Crowned Ridge Sound Level Tabular Results
		Sorted by Sound Level (16 Turbines removed)
	A44	Crowned Ridge Sound Level Tabular Results
		Sorted by Receptor ID Realistic
	A44-1	Tyler Wilhelm & Sam Massey Rebuttal Testimony
	A44-2	Letter from Dennis Schmeling
	A45	Updated Maps
		Applicant's Responses to Intervenor's Fifth
		Set of DR's to Crowned Ridge Wind
	A45-1	Attachment 1 to 5-2
	A45-2	Attachment 1 to 5-5
	A45-3	Attachment 1 to 5-7
	A45-4	Attachment to 1 to 5-12
	A46	Applicant's Responses to Staff's Sixth Set of
		DR's to Crowned Ridge Wind Confidential
	A46-1	Attachment 1 to 6-1
	A46-2	Attachment 1 to 6-2
	A47	The Ohio Power Siting Board - Amended
		Testimony of David Hessler

I N D E X (Continued)

APPLICANT EXHIBITS

A48	Public Service Commission of Wisconsin - David Hessler's Exhibit 4 - Low-Frequency Noise and Infrasound from Wind Turbines, Noise Control Engineering Journal
A49	PSC Docket No. 2535-CE-100 - Ex.-Clean Wisconsin - Hessler - 4 Low-Frequency Noise and Infrasound from Wind Turbines, Noise Control Engineering Journal
A50	Transcript of Public Service Commission of WI October 10, 2012, Docket N. 2535-CE-100
A51	Minnesota Regulation on Sound - 7030.0050 Noise Area Classification and 7030.0040 Noise Standards
A53	Final Land Status Map
A54	Replacement Final Land Status Map
A55	Proposed Turbine Drops and Moves
A56	Appendix D Sound ISO-Lines Map Book Hessler
A57	Appendix C-3 Sound Results Table Rev 6
A58	Final Land Status and Hessler 7 on Intervenor's
A59	Final Land Status and Hessler 7 Turbine Moves
A60	Hessler 7 on Hessler Identified Nonparticipants
A61	Joint Stipulation of Agreed to Conditions Between Crowned Ridge and PUC Staff
A62	FAA Pending Turbine Locations
A63	Amended Condition 26 (Sound Level)
A64	Granquist Option Confidential
A65	Papio Valley Land Confidential
A66	Crowned Ridge Wind's Letter regarding Extreme Cold Weather Package
A67	Appendix C-1 Shadow Results Table Rev5
A68	Appendix C-2 Shadow Results Table Rev5
A69	Insurance Confidential
A70	Turbines and Grasslands

I N D E X (Continued)

PUC STAFF EXHIBITS

S1 David Hessler Direct Testimony and Exhibits
 S1-A Staff's Responses to Applicant's First DR
 S2 Darren Kearney Direct Testimony and Exhibits
 S3 Tom Kirschenmann Direct Testimony and Exhibits
 S4 Paige Olson Direct Testimony and Exhibits
 S5 Additional Staff Data Requests
 S5 Additional Staff Data Requests Confidential
 S6 Supplemental Responses to Staff DR 6
 S7 Staff's Proposed Lek Monitoring Condition

JUDICIAL NOTICE - SB16

INTERVENORS EXHIBITS

I1 Public Service Commission of Wisconsin - A
 Cooperative Measurement Survey and Analysis of
 Low Frequency and Infrasound at the Shirley
 Wind Farm in Brown County, Wisconsin
 I2 NARUC - 2011 - Assessing Sound Emissions from
 Proposed Wind Farms & Measuring the Performance
 I3 Paul Schomer and Pranav Krishna Pamidighantam -
 A Possible Criterion for Wind Farms
 I4 Research Gate - Health Effects from Wind
 Turbines Low-Frequency Noise & Infrasound: Do
 Wind Turbines Make People Sick? That is the
 Issue
 I5 David Hessler and George Hessler, Jr. -
 Recommended Noise Level Design Goals and Limits
 at Residential Receptors for Wind Turbine
 Developments in the US
 I6 Partial Transcript of the Evidentiary Hearing
 of EL18-026
 I7 Canons of Ethics for the Institute of Noise
 Control Engineering of the USA
 I8 Night Time Noise Guidelines 2009 (WHO)
 I9-A Ollson 2014 Suncor Statement
 I9-B Ollson 2014 Suncor Statement
 I10 Ollson 2014 Presentation
 I11 Thyen Exhibit A Memorandum 2007
 I12 Thyen Exhibit B Release Letter 2012
 I13 Thyen Exhibit C Sound Map 2019.5.24
 I14 IAIA Assessment
 I15-A DR to Intervenors 4-1
 I15-B Jay Haley Resume

I N D E X (Continued)

INTERVENORS EXHIBITS

I16 SD License Search Mr. Haley
I17-A ND License Search Mr. Haley
I17-B ND License Search Mr. Haley
I18 MN License Search Mr. Haley
I19 MN License Affidavit Mr. Haley
I20 Mr. Haley Cover Letter App H 1/22/19
I21 Mr. Haley Cover Letter App I 1/22/19
I22 Mr. Haley Cover Letter Updated Appendices
Sound A-D 2/19/19
I23 Mr. Haley Cover Letter Updated Appendices
Flicker A-O 2/19/19
I24 Mr. Haley Cover Letter Landowner Participation
Sound 2/26/19
I25 Mr. Haley Cover Letter Landowner Participation
Flicker 2/26/19
I26 Mr. Haley Cover Letter Additional Structures
Sound Ex 1 2/19/19
I27 Mr. Haley Cover Letter Additional Structures
Flicker Ex 3 2/19/19

1 MS. CREMER: Good morning, everyone. We are on
2 day two, and I will call the hearing back to order in
3 Docket EL19-003 in the matter of a permit for the Crowned
4 Ridge Wind farm.

5 Just a couple of housekeeping things. The room
6 is open over lunch so you can leave your things in here.
7 It's being monitored by administrative staff. It will be
8 locked 15 minutes after or at the close of the hearing at
9 the end of the day. So get your stuff out of here
10 quickly, what you need.

11 And the Capitol doors are locked at 7:00 p.m.
12 So if you are loading and going in and out, make sure you
13 have someone there to open the door for you.

14 Is there anything else?

15 When we went into recess last night we were in
16 the middle of the direct case of Crowned Ridge Wind. At
17 this time I will call upon CRW to call their next witness
18 or take whatever action.

19 MR. SCHUMACHER: Thank you. Applicant calls
20 Jay Haley.

21 (The oath is administered by the court reporter.)

22 DIRECT EXAMINATION

23 BY MR. SCHUMACHER:

24 Q. Please state your name, business title, and company
25 for the record.

1 A. My name is Jay Haley. My business title is
2 mechanical engineer and partner. And the company that I
3 work for is EAPC Architects Engineers, doing business as
4 EAPC Wind Energy.

5 Q. What is your role with the Crowned Ridge Wind
6 Project?

7 A. I provided the noise and shadow flicker studies.

8 Q. Please provide a short overview of your education
9 and experience.

10 A. I spent six years as the director of engineering for
11 an aerospace firm called Ideal Aerosmith, then 10 years
12 as a research engineer with EERC; that's the Energy and
13 Environmental Research Center. I've since been with EAPC
14 for 20 years, a little over 20 years.

15 I am a technical advisor for the U.S. national
16 committee for the international standards group that is
17 developing an international standard for wind resource
18 and energy assessments and site suitability input
19 conditions for wind farms.

20 And my company is also the sole sales and support
21 agent for a software program called WindPRO, which is the
22 world's leading software program that's used for the
23 design of wind farms. And in that capacity I have
24 trained well over 200 engineers, meteorologists, and
25 others in the proper use of WindPRO to design wind farms,

1 including noise and shadow flicker studies.

2 Q. Describe your licensing status.

3 A. Excuse me. My licensing status is that I've been a
4 registered, licensed engineer in the State of North
5 Dakota and Minnesota for about 25 years. Back in 2016 I
6 elected to let my registration lapse and not renew it
7 because the continuing education requirements had been
8 ramped up a little bit and I'm getting close to retiring
9 and I just decided that I haven't stamped a drawing in
10 20 years -- it's not necessary for the design work I do
11 with wind farms -- so I elected to let it expire.

12 Q. Did you file Prefiled Direct Testimony and exhibits
13 on January 29, 2019, marked as Exhibit A2?

14 MR. GANJE: Excuse me. For the record, I'm
15 going to object to the testimony and the evidence that is
16 going to be or will be offered to be submitted by this
17 Applicant.

18 I would like to make some objections to his
19 credentials and would like the opportunity to ask him
20 some questions and then make a record on my objections.

21 MS. CREMER: Certainly.

22 MR. GANJE: Thank you.

23 Mr. Haley, do I understand from the comments you
24 just made that you're not currently licensed as a
25 professional engineer?

1 THE WITNESS: That is correct.

2 MR. GANJE: But you previously were.

3 THE WITNESS: That's correct.

4 MR. GANJE: I take it that you're also then not
5 licensed by reciprocity or otherwise in the State of
6 South Dakota as a licensed engineer.

7 THE WITNESS: I've never been licensed in
8 South Dakota.

9 MR. GANJE: By reciprocity or otherwise.

10 THE WITNESS: That's correct.

11 MR. GANJE: Okay. Isn't it true with regard to
12 the flicker and the sound report that you did here that
13 you identified yourself as a professional engineer by
14 using the title with your name and then after your name
15 P.E. following your name?

16 THE WITNESS: Yes, I did. That is correct.
17 About two weeks ago I learned that when my license lapsed
18 I was no longer able or supposed to be using the initials
19 P.E. after my name, which I was not aware of. My
20 understanding was that if my license had lapsed, I would
21 no longer be able to stamp drawings, which as I indicated
22 I haven't done for 20 years.

23 So in having a conversation with the
24 registration board and understanding that I shouldn't be
25 using the P.E. after my name, I have since dropped it.

1 MR. GANJE: And when did you learn that, please.

2 THE WITNESS: About two weeks ago after you
3 inquired to the state board on my status.

4 MR. GANJE: So isn't it also true that on
5 March 20 of this year at a public hearing on this matter
6 in Waverly, South Dakota that you described yourself as a
7 professional engineer?

8 THE WITNESS: Is that the question?

9 MR. GANJE: Yes.

10 THE WITNESS: Yes, I did. Someone had
11 challenged why I had not stamped -- that I was not
12 registered in the State of South Dakota and that I had
13 not stamped my work.

14 And my response to that was that I have been a
15 registered professional engineer for almost 30 years and
16 that stamping the shadow flicker and noise studies was
17 not required and, in fact, would have been inappropriate.

18 MR. GANJE: Well, isn't it true that on March 20
19 of this year you stated that you were at that time --
20 I'll use your words and I'll give you a copy of the
21 transcript if you'd like to confirm this.

22 You stated, "To answer your first question, yes,
23 I am a registered professional engineer." And that was a
24 statement you made in South Dakota at one of the hearings
25 on this Application.

1 THE WITNESS: If that's a quote, then that's
2 what I said. But my understanding in my head at the time
3 was the fact that I had passed the professional
4 engineer's exam gave me the right to call myself a
5 professional engineer.

6 MR. GANJE: And you would agree without my going
7 through the documents, I suspect, which I can do, that
8 you consistently signed letters to interested parties
9 regarding this Application in which you indicated that
10 you were a professional engineer?

11 THE WITNESS: Yes, I did.

12 MR. GANJE: And you signed the fundamental sound
13 survey in this Application indicating you were a
14 professional engineer.

15 THE WITNESS: I've had P.E. behind my name for
16 30 years on my business card on with my website on the
17 signature line on all of the reports that I do. And as I
18 stated, I did not understand that having no longer
19 renewed my license that I needed to drop those initials
20 from my title.

21 MR. GANJE: So in March when a question was
22 asked of you about your status as a professional engineer
23 in that hearing in Waverly, South Dakota did you then
24 check about your status?

25 THE WITNESS: No, I did not. I knew my status,

1 that I had let my license expire. That was by choice.

2 MR. GANJE: But you didn't say at the hearing
3 that you let it expire, did you?

4 THE WITNESS: That was never asked. That really
5 wasn't the question.

6 MR. GANJE: Well, you did answer whatever
7 question was asked by saying I am a registered
8 professional engineer; correct?

9 THE WITNESS: I don't recall. But I remember
10 saying that I had been a professional engineer for about
11 30 years.

12 MR. GANJE: If I could please mark this
13 (indicating).

14 MR. SCHUMACHER: Yeah. I'm going to object to
15 any further questions along this line. He's established
16 what he's looking to establish, that his professional
17 engineer status has lapsed. I don't see any point in
18 pursuing this any further. The question has very much
19 been asked and answered.

20 MS. CREMER: You can respond. Yes.

21 MR. GANJE: Yes. He seems to be vacillating a
22 little bit about what he said at that hearing, and what
23 he said was really quite clear. And I didn't want the
24 record to indicate there was any vacillation. He
25 indicated at that time, and this was in March, that he

1 was a --

2 MR. SCHUMACHER: And I would add to my objection
3 that this isn't relevant to anything here. The witness
4 has already established that professional engineer status
5 and stamping of these reports is not only not required
6 but inappropriate.

7 MR. GANJE: I think I've made my argument.

8 MS. CREMER: And were you going to pursue
9 further lines other than this on the licensing?

10 MR. GANJE: Yes.

11 MS. CREMER: Okay. So as to this line of
12 questioning, I think you -- I think you've established
13 what you want to establish in terms of his licensing so I
14 would sustain for that part.

15 And then you can move on to what your next
16 objection is.

17 MR. GANJE: Yes. Thank you.

18 My objection is that this witness has
19 represented very clearly on multiple documents which are
20 the exhibits to which I did not stipulate in this
21 proceeding and his report and testimony was referred to
22 by others in the course of their testimony or reference
23 because he's a principal witness and discussed matters of
24 wind modeling survey and a flicker study.

25 Throughout all the work that he did in this

1 matter he represented that he was a professional
2 engineer. That's a significant representation. That's a
3 representation of a license.

4 This witness has acknowledged he does not have a
5 license now. He does not have a license in Minnesota,
6 South Dakota, or North Dakota. And a license is required
7 for use of the term "professional engineer."

8 South Dakota compiled laws 36-18A-1.1 requires this, and
9 North Dakota Century Code 43-19.1-27(5) requires this.

10 The witness cannot make such a significant
11 representation to this Commission and expect us just to
12 give it a pass. I'm going to move that all of the
13 proposed testimony of this witness and the exhibits of
14 this witness and supplemental reports and principal
15 reports of this witness, including the maps and other
16 paperwork involved in his work for the Applicant, be
17 stricken.

18 And I'm going to move that the admission of any
19 of his testimony be denied because he's misrepresented
20 his status to this Commission, the public, and to my
21 clients as the Intervenor. And he's doing that
22 throughout, even though it was brought to his attention
23 in March, which would give a reasonable man at that point
24 a time to look and make proper correction of what he's
25 stated.

1 This is very serious. This is -- you can't do
2 that. It's perpetrating a falsehood, and it has an
3 effect on what he's done. It has an effect on his
4 credibility. It has an effect on the competency of the
5 evidence that he would present. And I believe that all
6 of this should be stricken from the record and I believe
7 that it should be inadmissible and I so move at this
8 time.

9 MS. CREMER: Do you have a response?

10 MR. SCHUMACHER: Yes. Thank you very much.

11 The witness has established that not only has he
12 been doing these studies and providing these reports for
13 nearly 30 years, he has trained a couple hundred
14 additional people in the use of this modeling software.

15 He's clearly established that he is not only
16 competent but a leader in the field in providing sound
17 and shadow flicker studies with this technology.

18 The objection of the Intervenor goes to weight
19 and not admissibility. The witness readily admits that
20 he did not renew his professional engineer license and
21 that as soon as he learned it was inappropriate to
22 continue to use that title, he ceased doing so. That
23 does not eliminate his experience and credentials in
24 doing these studies and providing these modeling reports.

25 I think the issue is a question of whether that

1 affects the weight that the Commission gives his
2 testimony, but it certainly should not make it
3 inadmissible.

4 MR. GANJE: With your permission, I would like
5 to hand out a brief on this matter. I'll be sure that
6 Applicant gets a copy.

7 MS. EDWARDS: Can I have five minutes to read
8 this?

9 MS. CREMER: Yeah. Let's take five minutes
10 here.

11 (A short recess is taken.)

12 MS. CREMER: Okay. So we've had an opportunity
13 to glance at the brief.

14 Staff, did you have a position?

15 MR. MIKAL HANSON: In my experience that if they
16 can establish by training, education, and experience that
17 a witness is an expert, that's the determination that the
18 Hearing Examiner should make. Whether they have a
19 license or not certainly adds to that, but it isn't the
20 end-all determination.

21 I do think that the fact that he's said he's a
22 professional engineer goes to his credibility and
23 something that the Commission should weigh and consider
24 when they're considering his testimony, but I don't
25 think -- our position is that it in and of itself does

1 not disqualify him as an expert witness if the Commission
2 believes that he does have the training and experience
3 and education.

4 MS. CREMER: Thank you.

5 I am prepared to rule, but did the Commission
6 want to weigh in on anything?

7 CHAIRMAN HANSON: If I may, I just have a couple
8 of questions.

9 Sir, you said that your licensed lapsed. It was
10 not revoked?

11 THE WITNESS: No. It was a conscious decision
12 on my part. Like I say, I've been doing this for over
13 20 years and never stamped a document involving my wind
14 work.

15 They ramped up the requirements for renewal in
16 2016, and I looked into the future and knew that I was
17 going to be retiring in a few years so I said, well, I
18 haven't needed my license for 20 years. I think I'm not
19 going to renew at this time, not realizing that I needed
20 to drop the initials after my name.

21 CHAIRMAN HANSON: Okay. I can empathize with
22 that.

23 You put in the first page of your information
24 that you work as a wind engineer.

25 THE WITNESS: That's correct.

1 CHAIRMAN HANSON: So you don't think that's
2 misleading to say that?

3 THE WITNESS: No. That's a common title that is
4 used in our industry to describe the work we do because
5 it's oftentimes confusing to people. If I say that I'm a
6 mechanical engineer in a setting where I'm doing wind
7 farm design, that tends to confuse people so I adopted
8 the title wind engineer to make it easier for people.
9 That's just a title.

10 CHAIRMAN HANSON: Okay. I appreciate that.

11 I agree with Staff on if you can establish
12 credibility of an individual that they have that
13 background information -- I looked through as quickly as
14 I could on your testimony, having read it a couple of
15 times. I was looking for any place that you might have
16 said that you're an engineer or whatever other than on
17 that other page, and I didn't find anything.

18 But I've been licensed in a number of different
19 ways and I let mine go too and from that standpoint I
20 don't represent that I'm a licensed auctioneer or
21 appraiser or anything like that anymore. But I don't
22 find that in your testimony that you did either.

23 Thank you.

24 MS. CREMER: Thank you. So I'm going to
25 overrule your objection. The Commission can give it the

1 weight it deserves, and I will give you a standing
2 objection if you would so like.

3 MR. GANJE: I'm sorry. I would ask if the
4 Commission would kindly rule on my objection to the
5 entrance of the evidence as I described it and my motion
6 to strike any testimony or evidence that he might submit.

7 COMMISSIONER NELSON: Overruled.

8 CHAIRMAN HANSON: Overruled.

9 COMMISSIONER FIEGEN: Overruled.

10 MS. CREMER: You may proceed. Thank you.

11 MR. SCHUMACHER: Thank you.

12 Q. Mr. Haley, in your career starting with sound
13 studies, how many sound study reports would you estimate
14 that you have prepared?

15 A. I don't have an exact number, but it's over 100.

16 Q. And how many shadow flicker reports would you
17 estimate that you have developed in your career?

18 A. The same.

19 Q. Did you file Prefiled Direct Testimony and exhibits
20 on January 29, 2019, marked as Exhibit A2?

21 A. Yes, I did.

22 Q. Do you have any changes or corrections to your
23 initial Prefiled Direct Testimony and exhibits?

24 A. No. However, much of the information in that
25 original testimony has been superseded by -- changes in

1 the arrays and the information that follows is then
2 covered in additional submittals.

3 Q. And did you, in fact, provide updates marked as
4 Exhibit A8 and A9 on February 19?

5 A. Yes, I did.

6 Q. And additional updates marked as Exhibits A10 and
7 A11 on February 26?

8 A. Yes.

9 Q. Did you also file prefiled Supplemental Testimony on
10 April 9, 2019, that is marked as Exhibit A22 with
11 exhibits marked A22-1, A22-2, and A22-3?

12 A. Yes, I did.

13 Q. And do you have changes or corrections to that
14 testimony?

15 A. There are additional changes due to the latest array
16 changes that occurred over the weekend.

17 Q. Did you also file Prefiled Rebuttal Testimony on
18 May 24, 2019, that is marked as Exhibit A43 with
19 accompanying exhibits marked A43-1, A43-2, A43-3, A43-4,
20 and A43-5?

21 A. Yes, I did.

22 Q. Do you have changes or corrections to that
23 testimony?

24 A. No. Other than what I stated previously.

25 Q. Would you provide a short summary of your prefiled

1 testimony, first with regard to sound studies?

2 A. Sure.

3 So with the sound study, there are a number of
4 inputs that go into the model for the turbine locations
5 and the turbine specifications, including the noise
6 emission data. There's terrain elevation data, height
7 contours. There's attenuation assumptions that go into
8 the model, including ground and atmospheric attenuation.

9 We also put in the receptor locations and the
10 landowner participation status.

11 There are a number of assumptions that need to be
12 made in this model, and most of them are conservative,
13 including the turbines are always operating at maximum
14 sound output levels. An additional 2 decibels is added
15 to that, to the turbine sound emission data, to make it
16 more conservative.

17 We also assume that all of the receptors are
18 downwind of all of the wind turbines at all times, which
19 is a physical impossibility but it makes the results more
20 conservative.

21 We also assume that the atmospheric conditions are
22 most favorable for sound transmission so that there is a
23 minimal amount of attenuation.

24 Also in Grant County where there is a requirement
25 that the noise be measured 25 feet from the perimeter of

1 the structure we modeled it 50 feet from the perimeter of
2 the structure, which means that it will be more
3 conservative.

4 And we also included all of the alternate wind
5 turbines in the model run so that even if they're not
6 going to be there at the end of the day, we are assuming
7 that they're there so their contributions are being added
8 in.

9 In terms of noise limits in Codington County, we
10 used 50 decibels at the nonparticipating property line as
11 the criteria, the compliance criteria. In Grant County
12 we used 45 decibels at nonparticipating occupied
13 structures and 50 decibels at participating occupied
14 structures.

15 In addition, we also applied the Grant County
16 requirements to the Codington County structures, which is
17 above and beyond Codington's ordinance requirements.

18 The results of the studies indicate that all of the
19 receptors based on this latest array -- all receptors are
20 in compliance with both Codington and Grant County's
21 ordinances, and in addition Codington County structures
22 are also in compliance with Grant County's ordinance,
23 which is the more restrictive of the two.

24 Q. Can you provide a short summary of your prefiled
25 testimony with regard to shadow flicker studies?

1 A. Sure. Well, for the shadow flicker model there are
2 a number of inputs as well. We input the turbine
3 locations and the turbine specifications and, in
4 particular, the width of the turbine blades and the power
5 curve.

6 We also in this case incorporate the wind data,
7 which means that a joint wind speed and wind direction
8 distributions. We also input sunshine probabilities to
9 account for how many days are sunny and how many days are
10 cloudy. Again, the receptor locations and the height
11 contour terrain, elevation information.

12 We use a number of conservative assumptions in these
13 models. The first assumption is that the shadow
14 receptors are in what is called a greenhouse mode. You
15 can think of that as a glass house, meaning that whether
16 there's a window on the facade of the building or not,
17 we're assuming that that facade of the building is
18 actually all glass. So there will be flicker seen from
19 shadows cast in that direction even though there may not
20 be a window in that direction, which makes the results
21 more conservative.

22 We also don't take any credit for any sort of
23 blockage from trees or other outbuildings. We also
24 assume that the wind turbines are operating 100 percent
25 of the time, meaning that any time the wind is blowing,

1 there will be rotors turning. There's no such thing as a
2 turbine being down for any reason if the wind is blowing.

3 Another is that the rotors are always facing the sun
4 so that they're casting the maximum shadow width that is
5 possible. If the turbine was not facing directly into
6 the wind, that shadow would be narrow, and, therefore, it
7 would register less hours of shadow flicker. We assume
8 that it's facing directly into the sun casting the widest
9 shadow possible at all times.

10 And, once again, we also included all of the
11 alternate turbines in this model, whether they're
12 actually going to be there at the end of the day or not.

13 There are also a couple of realistic assumptions
14 that we factor in in the shadow model. And one of them
15 is that we don't start counting shadow until the sun is
16 at least three degrees above the horizon. If the sun is
17 lower than that, the shadow that is cast has to pass
18 through so much atmosphere that the diffusion -- there
19 basically is no shadow.

20 We factor in the sunshine probabilities. We look at
21 weather data to know how many sunshine hours there are
22 per month, and we reduce the hours by that to make it a
23 more realistic number. And we also factor in the
24 operational time of the wind turbines, which is based on
25 the wind speed data that we put in. If the wind speed is

1 zero, there will be no rotation of the rotor so,
2 therefore, there will be no shadow flicker.

3 The limit that we applied in this case was 30 hours
4 of shadow flicker per year maximum for all receptors,
5 whether they're participating or nonparticipating. And
6 the results of the study are that all receptors were
7 below 30 hours with one exception, which is a
8 participating receptor with 36 hours and 59 minutes. So
9 37 hours of shadow flicker per year.

10 Q. With regard to the one receptor over 30 hours of
11 shadow flicker per year, are you aware of the mitigation
12 plan with regard to that receptor?

13 A. I don't know exactly what the plan would be, but I
14 would say the two likely options would be either to
15 curtail it for seven hours a year or to get the
16 participating landowner to sign a waiver that he doesn't
17 care about those seven hours.

18 Q. In both your sound studies and shadow studies did
19 you take into account impacts from neighboring wind
20 projects?

21 A. Yes, I did. We included the impacts of both Crowned
22 Ridge and Crowned Ridge II and Dakota Range I and Dakota
23 Range II.

24 Q. And would that have changed the outcome of your
25 studies in any respect?

1 A. I don't understand your --

2 Q. Do the sound and shadow flicker studies still
3 indicate that the receptors are still within the confines
4 of the county ordinances?

5 A. Yes. The adjacent wind farms were included in the
6 analysis so any results that I talked about are with the
7 cumulative impacts of the adjacent wind farms.

8 Q. Mr. Haley, did you prepare additional exhibits as a
9 result of the most recent change in the turbine layout?

10 A. Yes, I did.

11 Q. And would those have been Exhibits A55, A56, A57,
12 A58, A59, and A60?

13 A. Yes.

14 Q. And what do those exhibits show with regard to sound
15 and shadow flicker impacts following the latest change in
16 the turbine layout?

17 A. They basically demonstrate the results that I
18 just -- that I mentioned earlier in my testimony here,
19 that everything is within the county ordinance, and above
20 and beyond that, both counties comply with the more
21 restrictive Grant County ordinance. I'm sorry. That was
22 talking about the noise study.

23 But with regard to the shadow study, the results are
24 what I discussed. You have the one receptor that's over
25 30.

1 Q. And throughout the course of your studies and
2 modeling did you include what initially have been
3 identified as alternate turbine sites?

4 A. Yes. All alternates were included in all model runs
5 for both noise and foreshadow.

6 MR. SCHUMACHER: If I may approach.

7 MS. CREMER: Yes.

8 MR. GANJE: Excuse me, counsel. The exhibits
9 that you referred to were new ones. Would you be kind
10 enough to -- I think you started with 56. Would you
11 recite those again for my benefit.

12 MR. SCHUMACHER: Yeah. Those are Exhibits 56
13 through 60. Excuse me. 55 through 60.

14 MR. GANJE: Just for the record, the Staff
15 counsel this morning provided me an updated exhibit list,
16 and I am not -- it's not following that identification of
17 labelling.

18 MS. CREMER: Could you just -- because I was a
19 little confused myself, could you just tell us what 55 --
20 the name on it or something.

21 MR. SCHUMACHER: Yep. I'll do that.

22 MS. CREMER: Okay.

23 MR. SCHUMACHER: Exhibit 55 is the proposed
24 turbine drops and moves that was indicated by the map
25 that we displayed yesterday. Exhibit 56 is the sound ISO

1 lines map showing the movement of the Hessler seven as
2 we've identified them.

3 Exhibit 57 is the table showing the sound
4 results after relocating those turbines. Exhibit 58 is
5 final land status on the Hessler seven and on the
6 Intervenor showing the impact. 59 shows the actual
7 turbine moves.

8 MR. GANJE: Counsel, for your information -- for
9 your information, that isn't what I'm showing here so I
10 suspect that Staff and myself do not have that.

11 I show -- I do show an A58, which is a final
12 land status. And then I show what appears to be a
13 duplication at 59 of the same document. In other words,
14 my 59 says also final land status. Although it does say
15 moves.

16 MR. SCHUMACHER: I'll help you with that. 58 is
17 the exhibit that lists each of the Intervenor and shows
18 the change in impacts after moving the turbines nearest
19 to them.

20 59 is the exhibit that shows and lists each of
21 the specific turbines that were relocated. And
22 Exhibit 60 shows the impacts on nonparticipant receptors
23 after adopting the Hessler seven turbine moves.

24 MR. GANJE: Thank you.

25 Now when you provided me copies of your exhibits

1 were these included?

2 MR. SCHUMACHER: Yes. I believe we provided you
3 copies of these yesterday.

4 MR. GANJE: Thank you.

5 Thank you.

6 MS. CREMER: Thank you. You may proceed.

7 MR. SCHUMACHER: Thank you.

8 Q. Mr. Haley, I've handed you an exhibit marked as A58.
9 Can you identify that?

10 A. Yes. Yes, I can.

11 Q. And what is that?

12 A. It's a table that lists the sound and shadow flicker
13 impacts on the Intervenor and the Waverly school.

14 Q. And what does that show with respect to the impact
15 of relocating the turbines identified on this exhibit?

16 A. Well, I'd say that most of the impacts are way below
17 the ordinance requirements. They've all changed and been
18 reduced by some amount due to the changes with the
19 Hessler seven being removed.

20 Q. And with respect to the second exhibit I've provided
21 you, would you identify what exhibit that is?

22 A. This is a list that just shows the noise impacts on
23 the -- adopting -- on nonparticipants as a result of
24 dropping the seven Hessler turbines. So these are not
25 necessarily the Intervenor. These are just a select

1 group of the more significant changes as a result of the
2 Hessler turbine drops.

3 Q. And would that have been marked as Exhibit A60?

4 A. That's correct.

5 MR. SCHUMACHER: That concludes our questions.

6 At this time we would offer Exhibits A2, A8, A9,
7 A10, A11, A22, A22-1, A22-2, A22-3, A43, A43-1, A43-2,
8 A43-3, A43-4, A43-5, A55, A56, A57, A58, A59, and A60.

9 MS. CREMER: Mr. Ganje.

10 MR. GANJE: If I may ask questions with regard
11 to an objection to the offer.

12 MS. CREMER: Certainly.

13 MR. GANJE: Mr. Hessler, if you could -- sorry,
14 Mr. Haley.

15 Mr. Haley, if you would be kind enough to put in
16 front of you -- I think you might have it there on your
17 laptop -- Applicant's Exhibit A1-H.

18 THE WITNESS: Applicant Exhibit A1-H.

19 Okay.

20 MR. GANJE: Does A1-H show itself to be a sound
21 pressure ISO lines map?

22 THE WITNESS: It's a report, a final report.

23 MR. GANJE: Okay. Would you look at the -- I
24 think the ISO map is at the end of the report.

25 THE WITNESS: Uh-huh.

1 MR. GANJE: I'm referring to the particular --
2 the Crowned Ridge Wind farm sound pressure ISO lines
3 overview map that was a part of that exhibit and is the
4 actual map of the project area with color coding.

5 THE WITNESS: Yes. I have it in front of me.

6 MR. GANJE: Thank you. I know there's been many
7 of them so I wanted to make sure you had that one. Thank
8 you.

9 Now I note in the right-hand column it shows
10 that it was checked by JH. Are those your initials?

11 THE WITNESS: Yes, they are.

12 MR. GANJE: Does that stand for the fact that
13 you approved this map?

14 THE WITNESS: Yes.

15 MR. GANJE: In fact, you were the supervising
16 party on this -- on this whole -- on Applicant's work,
17 weren't you?

18 THE WITNESS: Yes, I am.

19 MR. GANJE: Okay. And EAPC is the company you
20 referred to in your earlier testimony?

21 THE WITNESS: That's correct.

22 MR. GANJE: Okay. Mr. Haley, for ease of
23 reading, at least the ease of my reading and perhaps
24 yours, I'll claim a difficulty of nearsightedness, but
25 I'm going to hand you a blowup of some language found at

1 the bottom of that exhibit, and I'll also distribute a
2 copy of the language to the parties in interest here.

3 If I may approach the witness.

4 (The documents are distributed.)

5 MR. GANJE: Does the document that I show you
6 correctly indicate the language found in the lower
7 right-hand area of the exhibit we're now referring to?

8 THE WITNESS: Yes, it does.

9 MR. GANJE: Thank you.

10 This language, sir, seems to indicate that your
11 company, the one that provided this report, makes no
12 warranty with respect to any -- to the use of any of the
13 information in this drawing; is that correct?

14 THE WITNESS: I'm not a lawyer so I don't know
15 that I can accurately interpret this disclaimer language.

16 MR. GANJE: Uh-huh. But you don't dispute that
17 that language appears there?

18 THE WITNESS: No. I don't dispute that.

19 MR. GANJE: And the language also at the second
20 part says that your company in preparing this map does
21 not assume any liability with respect to the use of the
22 information.

23 Is that a correct or fair statement of the
24 language?

25 THE WITNESS: Yeah. That's what it says. Yes.

1 MR. GANJE: And does this language also state
2 that any recipient of the document releases your company
3 from any liability regarding the map itself or the work
4 of the map? Is that correct?

5 THE WITNESS: That's what it says, yes.

6 MR. GANJE: And does it also state that the
7 responsibilities for the applications and use of the
8 material contained in the document remain solely with the
9 client? Is that correct?

10 THE WITNESS: Yes. It says that.

11 MR. GANJE: And it is a true statement, is it,
12 that this language appears on all of the maps that you
13 prepared in the course of this project?

14 THE WITNESS: Yes. It's a standard part of the
15 title block.

16 MR. GANJE: I see. Okay.

17 On the grounds of this very powerful disclaimer
18 of any responsibility by this company that's providing a
19 very serious study that this Commission has to consider
20 in deciding whether to grant a permit and the fact that
21 this language in this disclaimer says we're not going to
22 stand behind -- we're not going to stand behind it at
23 all, anybody that uses it, uses it at their own risk,
24 this is extraordinary. And I think that this means that
25 nobody can rely on this.

1 What recommendations they make and what analysis
2 they provided is something that the Commission can't rely
3 on, the Intervenors can't rely on, the public can't rely
4 on, the Applicant can't rely on, and I think that that
5 taints the legitimacy, the efficacy, the reliability of
6 these maps.

7 And I, therefore, object on those additional
8 grounds to the admission of the submitted exhibits my
9 honorable opposition has now offered into evidence.

10 MS. CREMER: Crowned Ridge.

11 MR. SCHUMACHER: The fact that the work product
12 contains very standard disclaimer language does nothing
13 to change the work and the experience that went behind
14 the data included in the documents on here.

15 Disclaimers are a standard part of life and show
16 up on just about everything we use from our e-mails to
17 phones and computers, and it's a normal part of life to
18 include disclaimer language in documents. And it doesn't
19 change the fact that the work product presented here is
20 the result of considerable expertise and work and study
21 on the part of this witness.

22 MS. CREMER: Staff.

23 MR. MIKAL HANSON: Civil disclaimer appears to
24 be going towards a civil lawsuit, and it really doesn't
25 have any relevance in a permitting process. We don't

1 think it disqualifies the document.

2 MR. GANJE: If I may reply.

3 MS. CREMER: Yes.

4 MR. GANJE: This disclaimer, Madam Examiner,
5 goes to everything and everybody. It says the
6 responsibilities of the applications and use of the
7 material contained in this document remain solely with
8 the client.

9 This provider is not -- this is not what was
10 my -- a standard part of life or a normal part of life?
11 We're not talking about a normal part of life here.
12 We're talking about an Application for a very
13 sophisticated wind farm facility.

14 And these people are the people that are telling
15 the Commission, the Intervenors, and the public that we
16 did it right; you're good on the sound, you're good on
17 the flicker, you can rely on what we said.

18 But now we're learning, no, we can't rely on
19 anything because they won't stand behind it. They're not
20 going to be liable for it, and people are using it at
21 their own risk. This is extraordinary.

22 I think, as I said before, it taints it. And to
23 pass this off as something -- the same thing you get when
24 you sign up some other kind of consumer contract is
25 highly irrelevant to the argument that this is saying we

1 won't tell you this is good and we won't stand behind it.
2 And those are the reasons for my objection -- additional
3 objection.

4 MS. CREMER: And I'm going to overrule your
5 objection and just ask to bear in mind that I just need a
6 couple of words as to your objection. And really a lot
7 of what you're doing is closing argument.

8 So they would be admitted. The list that you
9 ran through, Crowned Ridge, were the same ones I had
10 marked, and so those exhibits are admitted.

11 MR. SCHUMACHER: We would pass this witness for
12 cross-examination then. Thank you.

13 MS. CREMER: Thank you.

14 Mr. Ganje.

15 CROSS-EXAMINATION

16 BY MR. GANJE:

17 Q. I believe the Chairman indicated that he -- I'm not
18 sure that this is exactly what he said, but it concerned
19 me a bit that he didn't really find any place in the
20 papers and reports and so forth that you submitted where
21 you represented that you were a P.E.

22 But you would agree with my prior questions, but
23 I'll clarify them, that on the cover of the initial and
24 important report for modeling of sound, on the cover of
25 the flicker study you represented yourself as a P.E. On

1 all of the letters that you sent supporting any
2 supplemental information you also signed as a
3 professional engineer. Is that correct?

4 A. As I stated about five times already, that's been a
5 standard part of my signature for 30 years, and I
6 overlooked the fact that the initials needed to be
7 dropped. So, yes, they were on every signature line that
8 I put on there.

9 Q. And that would also be true for the applications
10 that you put in front of the counties of Codington and
11 the counties of Grant when you submitted paperwork to
12 them; is that correct?

13 A. Yes, it is.

14 Q. That is in this proceeding, to make that clear. In
15 this proceeding?

16 A. What's your question?

17 Q. I want to make -- when you put the paperwork in
18 front of Codington County and Grant County my question
19 was going to the work that affected the Crowned Ridge
20 Project.

21 I don't know what you've said in other instances or
22 other projects, but when I asked you whether you also
23 represented -- let me restate the question. I'm not
24 trying to confuse you.

25 CHAIRMAN HANSON: Excuse me. May I interrupt

1 here.

2 Appreciate you asking questions apparently on my
3 behalf. However, the framework of the questions that you
4 are working towards regarding county presentations and
5 things of that nature, what we're concerned with is
6 presentations here, not what presentations he may have
7 made before the county as he went. That's a county
8 affair.

9 And as far as my research quickly looking
10 through, I quickly looked through the written testimony
11 that has been presented to us. The packages that you are
12 referring to, I did check just now, and on January 22, he
13 did follow the P.E., which he has already testified to
14 and we've already gone through that process.

15 So if you have something new pertaining to
16 misrepresentation that would affect his ability to
17 provide information to us, that might be germane. But
18 we've ruled that he has the experience. Notwithstanding
19 what may have been written down as a post-signature line
20 that it was P.E.

21 We've ruled that he does possess the
22 experience -- that the fact that P.E. does or doesn't
23 follow his name does not negate the fact that he does
24 have the experience to present the information to us.

25 MR. GANJE: Yes, sir.

1 comparison of with and without the Hessler turbine drops.

2 Q. C-3 does?

3 A. Yes. But --

4 Q. That's every receptor?

5 A. Yes, it is.

6 Q. Okay. So that's important --

7 A. Correction. Sir, it's all of the structures.

8 Because the Hessler -- the Hessler proposal had -- was
9 dealing with the impacts at occupy structures. So what
10 I'm saying is it does not include Codington property
11 boundaries.

12 Q. That's not clear to me. Maybe I'm not listening
13 very well.

14 A. Okay. So Hessler's proposal was to drop a number of
15 turbines so that we would lower the impact at houses.

16 Q. Correct.

17 A. Okay. In Codington County we're concerned about the
18 noise levels at occupied parcel boundaries, not
19 structure.

20 Q. Correct.

21 A. So to address the Hessler -- the Hessler suggestion,
22 we modeled his 16 turbine drops and then our seven
23 turbine drops and focused on the impact on structures.

24 So this table does not include the impacts, the
25 changes of lower sound levels that would occur at

1 Codington property boundaries. That would have to be a
2 different table.

3 Q. All right. To me a table that does all 16 is not
4 relevant since we didn't move 16. We only moved seven;
5 correct?

6 A. Right. But this table shows the comparison of if
7 you -- no. I'm sorry. That's not correct.

8 This table shows the impact of the final turbine
9 drops that we made, that Crowned Ridge made.

10 Q. And that's exhibit -- C --

11 A. That's C-3.

12 Q. C-3.

13 A. And that's compared to not making the drops.

14 Q. Okay. I don't think C -- shouldn't it have an A?
15 A57? Is that --

16 MR. SCHUMACHER: Yes. That's correct.

17 MR. GANJE: Excuse me, counsel.

18 Staff counsel indicated there was a "we"
19 involved in these moves. I just want the record to
20 reflect that my clients haven't consented to any of this
21 relocation. So that's kind of misled the record in the
22 "we" because there are three parties here.

23 Would counsel agree?

24 MR. MIKAL HANSON: I'm not agreeing to anything.

25 MR. GANJE: Well, I'll have the record reflect

1 that when Staff counsel said that we were working on such
2 and such and we were moving them, that does not include
3 the Intervenors.

4 Thank you.

5 MS. CREMER: Thank you for that clarification.

6 Staff.

7 Q. Now with regard to shadow flicker, is there a final
8 map that the Commission should focus on for shadow
9 flicker?

10 A. To my knowledge, that hasn't been submitted at this
11 time. The shadow flicker impacts were not really
12 involved in all of the dropping of any -- the impacts of
13 shadow weren't a consideration when looking at the
14 impacts of dropping the Hessler turbines. That was a
15 focus on noise.

16 So the results that we've provided in this last
17 minute were focused on the noise. And then we also did
18 the shadow calculations but did not produce maps at this
19 time to show the impacts of those.

20 Q. And, to your knowledge, that isn't going to be done
21 or no plans to do that.

22 A. It could be done if you would like. I mean, we
23 just -- there wasn't time in the eleventh hour to produce
24 all those maps so we produced the ones that were
25 pertinent to noise.

1 Q. Was a table done on shadow flickering?

2 A. The tables exist, but the appendix like this was not
3 produced, again, due to the time constraints.

4 Q. Okay. But that would not be difficult to do if
5 they're already in existence?

6 A. That's correct.

7 Q. Now I think just this morning we had a letter from
8 an attorney involving the Lindgrens who used to be part
9 of the project.

10 Are you aware of any letter that their attorney
11 sent?

12 A. No, I'm not.

13 Q. They're concerned about -- it appears they're
14 concerned about the shadow flicker on their property. Do
15 you know if there will be some shadow flicker on their
16 property?

17 A. I may have that in my notes here. Let me check.

18 Q. But if there was a table on shadow flicker after the
19 changes, people could look that up, could they not?

20 A. Yes. Like I say, the appendices that would
21 represent that have not been produced due to time
22 constraints, but the information is available.

23 Q. All right.

24 Now you have testified on direct that the other wind
25 farms in the area -- the Dakota Range I and II, is

1 that --

2 A. That's correct.

3 Q. And the other Crowned Ridge II is a proposed wind
4 farm; correct?

5 A. Yes. And those turbines were included.

6 Q. To be fair, initially they were not. Is that fair?
7 Initially --

8 A. No. That's not correct. Initially Dakota Range I
9 and II were not included. But Crowned Ridge II has
10 always been included.

11 Q. I apologize. Okay.

12 But a Staff Data Request kind of triggered you folks
13 to include that?

14 A. That's correct.

15 Q. Did that trigger movement then? The cumulative
16 effect of not only your turbines on this project but the
17 neighboring project, did that trigger some people over
18 the limit of sound or shadow?

19 A. Yes, it did. I don't recall the exact effects but
20 they were minimal, but it did trigger the one receptor
21 C-61 that ended up being well over 30 hours because about
22 22 hours of that was being contributed by Dakota Range.

23 Q. Okay.

24 A. And since that time with the latest turbine drops
25 the Crowned Ridge offending turbine in that case was

1 dropped so now that receptor is well below the limit.

2 MR. MIKAL HANSON: May I approach the witness,
3 your Honor?

4 MS. CREMER: Yes.

5 MR. MIKAL HANSON: Or Hearing Examiner.

6 MS. CREMER: Queen.

7 Q. I'm going to show you what's been marked as Staff
8 Exhibit 1A. Can you take a peek at that?

9 Are you familiar with that document? I'm sorry.
10 Are you familiar with that document?

11 A. Which Data Request was this?

12 Q. I think it says on it.

13 A. Would that be -- no. I mean, I am familiar with all
14 the Data Requests. I just -- I'm trying to figure out at
15 what point in time in the project this information was
16 current.

17 Q. Now if you look at the -- if you look at the
18 turbines, we're going to take some of those out, seven of
19 those out, are we not? This is Hessler's proposed 16,
20 which you're going to take seven of them?

21 A. Okay. That's correct.

22 Q. All right.

23 MR. MIKAL HANSON: It's our exhibit. I think we
24 can mark it, can't we, or have a witness mark it, as long
25 as it's done on the record?

1 MS. CREMER: Yes.

2 Q. All right. I'm going to give you a red pen. The
3 turbines that are taken out have been identified as 16.
4 Can you put a red mark through there.

5 (Witness complies.)

6 Q. 19.

7 Okay. You're circling them?

8 A. Yep.

9 Q. All right. 22?

10 A. 23?

11 Q. 23. Yes.

12 68 down -- and 67 and 68?

13 A. 67, 68.

14 Q. Okay.

15 A. There should be two more.

16 Q. Pardon?

17 A. I think there should be two more, shouldn't there?

18 Q. I think they're not related --

19 A. There were seven.

20 Q. Yeah.

21 A. We've got five circled.

22 Q. All right. Do you know which other ones they are?
23 Would you have a document that would say that?

24 A. I do.

25 MR. GANJE: Just so the record is clear, would

1 you ask the witness if he would read all of them at once
2 so I could follow what's happening here.

3 MR. MIKAL HANSON: He's going to find the other
4 two, and then we'll do that.

5 Is that fair?

6 A. So the turbines that we dropped were 16, 19, 23, 49,
7 which I don't see on this list.

8 Q. All right. So why don't you just write it on the
9 side. Yeah.

10 A. 60, 67, and 68. 60 is on here.

11 Q. All right.

12 A. 49 I don't see.

13 Q. All right. Now if you look at the sound reduction,
14 all of those are fairly significant, are they not?

15 A. If I remember, the reason that these receptors ended
16 up on this table was looking at receptors that were above
17 42 that due to these changes ended up below 42.

18 Q. Correct. All right. And they're estimated amounts,
19 but you actually did a sound study, did you not, based on
20 this?

21 A. Yes. That's what the results in Table C-3
22 represent.

23 Q. C-3. But it's really some other number. It's A --

24 MS. CREMER: A57.

25 A. Yeah. The exhibit number.

1 MR. SCHUMACHER: A57 is the table that's
2 otherwise marked as C-3.

3 Q. And if the Commission went to that table, they would
4 see the actual amount of sound reduction if they looked
5 at those turbines, would they not?

6 A. Yes. That's in one of the columns, yes.

7 Q. I'm sorry. They looked at the receptors.

8 A. Well, we have the receptors listed as well as the
9 reduction.

10 Q. All right.

11 Are you the witness that would talk about
12 postconstruction noise studies, or is there someone else?

13 A. No. That is our -- a later witness.

14 Q. Can you identify him by name?

15 A. Rich Lampeter.

16 MR. MIKAL HANSON: We have no further
17 cross-examination.

18 MS. CREMER: Thank you. That would take us to
19 Commissioners.

20 Chairman Hanson.

21 CHAIRMAN HANSON: Good morning, Mr. Haley.

22 THE WITNESS: Good morning.

23 CHAIRMAN HANSON: When you were speaking when I
24 read your mini bio, I'll say that you participated with
25 the working group of the technical advisors as -- for the

1 U.S. national committee. Just as long as I have you
2 here, I'd like to ask you a couple of questions on that
3 quickly.

4 Because we've been -- obviously I think all
5 entities that are working through these processes would
6 love to have some additional information of this sort via
7 a group that would be researching it. I'm curious on the
8 time frame for which standards would be introduced.

9 Do you know when they are likely to have their
10 conclusions?

11 THE WITNESS: What kind of standard? Which
12 standard are you referring to?

13 CHAIRMAN HANSON: Well, apparently this is for
14 the purpose of assessment of wind resources, energy
15 yields.

16 THE WITNESS: Okay.

17 CHAIRMAN HANSON: Wind sound and flicker.

18 THE WITNESS: Yeah. So the standard that I'm
19 working on, the committee that I'm on, we're developing
20 an international standard that would show or -- show
21 what's required to do and report in a wind assessment --
22 wind energy assessment study so that everyone produces a
23 product that's the same so that it can be compared so
24 consultant A, their work can be compared to consultant B.
25 But that does not cover shadow or noise.

1 CHAIRMAN HANSON: Okay. I misunderstood then
2 what your role was in it. Appreciate that.

3 There's been quite a bit of discussion about the
4 changes of the numbers or the locations of the wind
5 turbines. And certainly with the changes there's
6 obviously the potential change for the flicker and the
7 sound, et cetera.

8 With the discussions that we've been having
9 here, it's my understanding that some of the locations
10 have not been absolutely specified that there's potential
11 for additional movement of those. And with the potential
12 of changing the flicker and sound onto receptors.

13 And you testified that there's another gentleman
14 apparently to testify posthearing. Will you be involved
15 in that at all?

16 THE WITNESS: No.

17 CHAIRMAN HANSON: Okay. Well, then I shan't ask
18 you the questions on it. Okay.

19 I will ask you, though, you and Mr. Hessler
20 disagree on whether or not there should be a test on the
21 ambient atmosphere of the receptor, at least some
22 receptors, prior to -- I don't mean to say prior to
23 installation but without considering the noise from the
24 sound levels from wind turbines.

25 Why not do that? Why not have an ambient test

1 of the -- from the sound standpoint so that you would
2 have an idea what it is?

3 THE WITNESS: Well, typically, from my
4 experience, the reason that they would do a
5 preconstruction survey would be to find out what the
6 ambient levels are so that there would be a requirement
7 in those cases that they would be required to do
8 postconstruction monitoring and you'd want to have a
9 preconstruction baseline.

10 And in cases where there was no requirement for
11 postconstruction measurement it wouldn't be done
12 preconstruction. That's been the general approach.

13 CHAIRMAN HANSON: Okay. That doesn't seem to --
14 I know that's the approach, but I don't know why it
15 wouldn't be done. It would just seem intuitive that
16 you'd want to know that. If there are shelter belts or
17 something of that nature where there's wind coming
18 through and particularly loud sounds, I would think that
19 you'd want to have that.

20 Your answers seem to be ambiguous on that as
21 well previously. I'm just -- I'd like an answer to it if
22 you can -- other than to say that, well, that's the way
23 we do it.

24 THE WITNESS: I could try to elaborate further
25 if you'd like.

1 CHAIRMAN HANSON: Sure.

2 THE WITNESS: The ordinances are concerned about
3 the noise emissions from the turbines. They don't --
4 they don't require that you add the ambient noise to the
5 turbine emission noise to determine what compliance is.
6 So there's no need to figure out what the ambient is so
7 you know what to add to the turbine to figure out what
8 the total noise is.

9 And we generally know that the ambient noise in
10 most windy places is, you know, approximately 35 decibels
11 or maybe a little higher. So I guess from my experience
12 and perspective there really wasn't much of a need or a
13 reason to spend the money and the time on a
14 preconstruction survey, unless you knew that you were
15 going to be asked to do postconstruction monitoring.

16 CHAIRMAN HANSON: So if there's a challenge
17 later on by one of the receptors and they claim that the
18 noise is greater than that, then you have to go out and
19 you can't -- it just seems to your disadvantage. But I
20 know that there's testing that you can do and arguments
21 you can make on that. It just -- it doesn't seem to make
22 sense to me.

23 THE WITNESS: If they do go out to do
24 postconstruction monitoring -- and Rich Lampeter can
25 speak to this better than I can, but they would typically

1 do ambient measurements at that time and consider those
2 to be more reliable and valuable than if they would have
3 taken those ambient measurements preconstruction.

4 CHAIRMAN HANSON: So they turn off the turbines
5 in order to do that?

6 THE WITNESS: I'm not sure how they do it, but I
7 know that they would rather take the ambient readings as
8 a part of the postconstruction measurement campaign.

9 CHAIRMAN HANSON: I believe -- and I hope I'm
10 not misrepresenting what Mr. Hessler said. But in
11 answering one of my questions regarding what's the
12 ambient noise level at night without wind turbines at
13 some farms and he said it's from 40 to 43 with wind, and
14 occasionally it can be above 50.

15 Well, obviously it can be above 50 anywhere
16 depending upon a storm or something of that nature.
17 Would you agree with that? Without considering storms
18 and such, what would your estimate be of what the ambient
19 noise level would be?

20 THE WITNESS: Well, if you're talking about the
21 ambient noise contributions from high wind and so forth,
22 yes, I would agree that it could easily be 40 decibels or
23 more. Yeah. And at that point you're drowning out the
24 noise from the wind turbines.

25 CHAIRMAN HANSON: All right. Thank you very

1 much.

2 COMMISSIONER NELSON: Good morning, Mr. Haley.

3 THE WITNESS: Good morning.

4 COMMISSIONER NELSON: In Mr. Hessler's questions
5 last week he indicated in your modeling you use a 2
6 decibel adjustment to ensure that your results are on the
7 conservative side. First of all, is that correct? And,
8 secondly, explain how that figures into your
9 calculations.

10 THE WITNESS: Yes. It is correct. And what it
11 does is it adds a layer of conservatism onto all of the
12 modeling results because we're assuming that the turbines
13 are emitting noise that's a full 2 decibels louder than
14 what the manufacturers say it will be.

15 COMMISSIONER NELSON: So you do your model run,
16 and then on the table you simply take 2 off of each of
17 your calculations?

18 THE WITNESS: No. We add 2. We get the turbine
19 manufacturer's noise emission data, and we add 2 decibels
20 to every value across the board.

21 COMMISSIONER NELSON: Okay. Thank you.

22 Could you go to Exhibit A58, please.

23 THE WITNESS: Okay.

24 COMMISSIONER NELSON: So this represents if the
25 Hessler seven turbines are dropped, the changes in sound

1 level at the Intervenor. And I fully understand the
2 changes for the Christenson property and Lynch property.
3 We see some significant reduction in sound for those
4 properties.

5 What puzzles me is we see an increase in the
6 Robish and the Mogen properties. Can you explain that to
7 me? If we are simply dropping turbines, how do we see an
8 increase in those properties?

9 THE WITNESS: That's a very good question. I
10 had the same question when I looked at the results. So I
11 looked back into the modeling and traced back through my
12 data responses and such.

13 The reason is that the original numbers in those
14 two cases did not include the Dakota Range turbines
15 because at that time they hadn't been put in the model
16 yet, but yet those are the data points that I had to plug
17 into this table.

18 COMMISSIONER NELSON: So you're telling me the
19 Dakota Range turbines would impact Mr. Robish's property?

20 THE WITNESS: That's what it looks like, yes.

21 COMMISSIONER NELSON: He's got to be a good
22 20 miles, 25 miles from the Dakota Range turbines.

23 THE WITNESS: That's the only difference that I
24 could find between the models.

25 COMMISSIONER NELSON: Well, obviously I don't

1 find that answer satisfying.

2 I understand the addition of perhaps why that
3 may be some impact on the Mogen property. And even
4 that's a good 10 miles.

5 Now in either case --

6 THE WITNESS: No. Mr. Robish is 2.4 miles away.

7 COMMISSIONER NELSON: Okay. I show Mr. Robish's
8 property just to the northeast of Strandburg. Is that
9 where you're showing his location?

10 THE WITNESS: I would need a map to point it
11 out, I guess.

12 This will just take me a minute.

13 COMMISSIONER NELSON: Certainly.

14 MS. CREMER: Would it work if we took about a
15 15-minute break?

16 THE WITNESS: That might be a good idea.

17 MS. CREMER: Okay. 10:15.

18 (A short recess is taken.)

19 MS. CREMER: Okay. Mr. Haley, you are going to
20 answer a question by Commissioner Nelson.

21 THE WITNESS: So we were wondering about the
22 exact location of the property; right?

23 So I have a map here that indicates it. So are
24 we in -- do you want to see this?

25 COMMISSIONER NELSON: No. I know where it's at,

1 but would you agree it's probably 25 miles from the
2 Dakota Range projects?

3 THE WITNESS: Oh. It is a distance from Dakota
4 Range, yes.

5 But what I did in the break is I looked at the
6 difference from Mogen's property to this one, and just
7 looking at the difference in their distances, to me that
8 looks plausible.

9 COMMISSIONER NELSON: Okay. And so there would
10 be some remnant of sound that would, in fact, go
11 25 miles. Is that what you're telling me?

12 THE WITNESS: Yeah.

13 COMMISSIONER NELSON: The last question I think
14 I've got, Mr. Ganje asked you a series of questions about
15 the disclaimer on your work product and calling into
16 question the reliability of your work project -- product.

17 So my question is have you done sound modeling
18 for projects that have subsequently had postconstruction
19 sound surveys done of the actual sound production?

20 THE WITNESS: I looked into that last week in
21 anticipation of a question like this. So I checked back
22 with a lot of my previous clients. The only place where
23 I thought that that may have occurred was in Minnesota,
24 and based on what I learned, none of those have had
25 postconstruction monitoring performed.

1 But I can also say that of all of the studies
2 that I have done, I have never received one complaint or
3 feedback that the numbers were high or wrong.

4 COMMISSIONER NELSON: Thank you. That is all
5 the questions I've got.

6 COMMISSIONER FIEGEN: Thank you, Mr. Haley.

7 You can probably see how the time constraint is
8 tough on a wind docket in South Dakota. And so you're
9 feeling the Commissioners' pain when it has stated six
10 months, and the industry didn't want that passed six
11 months a year ago and how hard it is to really come up
12 with final numbers and -- so you're kind of feeling our
13 pain.

14 So you talked about the timing issue. And I
15 certainly appreciate the developer moving things and
16 adhering to the Commissioners' advice last Thursday. But
17 the shadow flicker final tables you suggested because of
18 timing aren't available yet. Is that what your testimony
19 was?

20 THE WITNESS: Yes. I believe so.

21 COMMISSIONER FIEGEN: Okay. So how as a
22 Commissioner -- so as a Commissioner I get to ask
23 questions at an evidentiary hearing, but now I don't get
24 to ask questions about that table that's not available?

25 THE WITNESS: I do have the table here with me

1 on the computer, and I could look up specific receptors
2 if you would like. And we could also get that table
3 produced and available later in the hearing.

4 COMMISSIONER FIEGEN: Okay. So I would like to
5 see the table, and then I would like -- if your counsel
6 would agree if I have questions about the table, that I
7 may ask questions later in the hearing.

8 We have, you know, received many documents, like
9 you said, at the eleventh hour, and so it's hard as a
10 Commissioner to study everything and et cetera.

11 I still can't find on your testimony -- let's
12 see. I think it was April 3. Your testimony on April 3.
13 And your page numbers are numbered, and it's page 6 of 7.
14 You're talking about receptor 106 in page 6 of 7 in your
15 April 3 testimony. And I'm going to give you a little
16 bit of time.

17 (Discussion off the record.)

18 THE WITNESS: We're talking about my Direct
19 Testimony?

20 COMMISSIONER FIEGEN: Was it your Direct? It's
21 supplement. Supplement testimony and exhibits. April 3.
22 I think your Direct would have had January.

23 THE WITNESS: Yeah. I don't have that.

24 MR. SCHUMACHER: If I may, that would be the
25 exhibit marked as A22.

1 THE WITNESS: Okay. I'm there.

2 COMMISSIONER FIEGEN: So then do you see on
3 line 6 you talk about CR1-C106P?

4 THE WITNESS: I'm sorry. The page number? I
5 thought it was page 6.

6 COMMISSIONER FIEGEN: It is page 6 and line 6.
7 So we've got lots of 6s going on.

8 THE WITNESS: I think I'm in the wrong exhibit.

9 COMMISSIONER FIEGEN: Let's see. So I have
10 supplement testimony and exhibits.

11 THE WITNESS: Yep.

12 COMMISSIONER FIEGEN: Of Jay Haley, April 3,
13 2019.

14 THE WITNESS: Okay. I'm looking at the bottom
15 page number. And the top page number is different.

16 Okay. Now I'm on your page.

17 COMMISSIONER FIEGEN: I hope 666 doesn't mean
18 anything.

19 THE WITNESS: Okay. I'm sorry. I'm here now so
20 what was your question?

21 COMMISSIONER FIEGEN: Line 6. We're talking
22 about 106.

23 THE WITNESS: Yes.

24 COMMISSIONER FIEGEN: Help me -- is that
25 still -- and it talks about 50 hours, and it talks about

1 abandoned building but then an occupied residence.

2 Can you explain all of that to me?

3 THE WITNESS: 106 was verified by the land team
4 that it is, in fact, an abandoned building so it's been
5 dropped from our tables. In the more current tables. At
6 this time it was -- at this moment in time it wasn't --

7 We had it in our records as abandoned. The
8 Intervenors brought it up and said we should include it
9 so we did. We then later investigated and found out it
10 is, in fact, an abandoned building.

11 COMMISSIONER FIEGEN: So is 106 a tower or not a
12 tower anymore?

13 THE WITNESS: 106 is a receptor.

14 COMMISSIONER FIEGEN: Receptor. Okay. All
15 right.

16 So that is an abandoned building.

17 THE WITNESS: That's correct.

18 COMMISSIONER FIEGEN: Okay. I think -- let me
19 just look at my notes to see if I have any other
20 questions.

21 You talked about -- when you first testified you
22 talked about your sound inputs when you were doing --
23 when the lawyers --

24 When your lawyers, the Applicant lawyers, asked
25 you questions about how you modeled and you said most of

1 the time you used the conservative approach, and then you
2 gave examples of instead of 25 feet, 50 feet. You gave
3 all sorts of examples.

4 Why did you say most of the time? When don't
5 you use the most conservative?

6 THE WITNESS: I don't remember saying most of
7 the time. But I'm not saying that I didn't. But if I
8 did say that, in some cases we have developers that I
9 work for that do not want me to add the conservative
10 2 decibels. And so at their direction.

11 COMMISSIONER FIEGEN: Oh, okay. But in this
12 model you did use all your conservative approaches.

13 THE WITNESS: That is correct. Everything I
14 stated is what we did.

15 COMMISSIONER FIEGEN: Okay. Thank you. We
16 certainly appreciate that, and that makes our life easier
17 at the Public Utilities Commission when we look at your
18 item.

19 You talked about sunshine hours and that -- can
20 you explain again what you use for sunshine hours? Do
21 you use past --

22 THE WITNESS: Yes. They call it sunshine
23 probabilities. And what it is is they look at historical
24 weather data and keep track of how many sunshine hours
25 there are per day of every day over I think in this case

1 it was an 18-year period.

2 So then we turn that into a sunshine probability
3 by a month. And the first results of the model run
4 assume that the sun is always shining. So then that
5 gives us a number which we would call a worst-case
6 number.

7 And then we factor in that sunshine probability
8 to reduce the number from 100 percent of shadow flicker
9 down to a realistic number.

10 COMMISSIONER FIEGEN: So when you do the shadow
11 flicker is there any type of conservative -- did you talk
12 about your model is conservative because you
13 determined -- I can't remember exactly how you explained
14 it. But what conservatism do you put in that model?

15 THE WITNESS: I'm just going to refer to my
16 notes to make sure I don't miss something.

17 COMMISSIONER FIEGEN: Okay.

18 THE WITNESS: So the conservative assumptions
19 for the shadow flicker model are, number one, that the
20 receptors are what we call greenhouse receptors. And
21 that means basically the house is made of glass and,
22 therefore, we're counting shadows in places where there
23 wouldn't be any.

24 COMMISSIONER FIEGEN: And there was one more.

25 THE WITNESS: There's a few more.

1 COMMISSIONER FIEGEN: Okay.

2 THE WITNESS: We also don't take any credit for
3 blockage from trees or other buildings which may, in
4 fact, be the case. We also assume that the wind farm and
5 all the turbines are running at 100 percent availability.
6 That means that any time the wind is blowing every single
7 turbine is turning, even though in reality some of them
8 won't be.

9 COMMISSIONER FIEGEN: Okay.

10 THE WITNESS: Another one is that we assume that
11 the rotor, the turbine itself is always facing the sun
12 like a sunflower, and that then casts the widest shadow,
13 which is going to increase the number of shadow flicker
14 hours.

15 And when you factor in the wind data and the
16 wind direction, how much time the turbine spends facing
17 different directions, when we factor that in, that will
18 reduce that number.

19 COMMISSIONER FIEGEN: Okay. The fourth one is
20 the one that I couldn't remember.

21 Also you talked about one participant -- did you
22 talk about one participant having 37 hours --

23 THE WITNESS: That's correct.

24 COMMISSIONER FIEGEN: What number of tower is
25 that?

1 THE WITNESS: The receptor is CR1C10-P. And
2 that's Mark Fransen.

3 COMMISSIONER FIEGEN: Mark Fransen.

4 THE WITNESS: Fransen.

5 COMMISSIONER FIEGEN: And you also talked about
6 Grant and Codington Counties and their ordinances. And I
7 got a little confused. And I certainly appreciate it --
8 did you say that you use the most constrictive -- or
9 restricted sound and shadow ordinances?

10 THE WITNESS: The shadow's the same for both
11 counties. It's 30 hours. But, yes, in the case of sound
12 we modeled it based on the actual ordinance limitations
13 and then again applied the more stringent requirements of
14 Grant County to Codington County as well.

15 COMMISSIONER FIEGEN: Okay. And I, as a
16 Commissioner, I certainly appreciate that so the
17 footprint looks the same when we're dealing with
18 constituents. I certainly appreciate you guys modeling
19 that.

20 I think that was my only questions at this
21 point, and I'm going to reserve the opportunity to ask
22 questions after I see the final table.

23 Thank you.

24 MS. CREMER: Redirect.

25 MR. SCHUMACHER: Very briefly. Thank you.

REDIRECT EXAMINATION

BY MR. SCHUMACHER:

Q. Mr. Haley, do you recall Staff Attorney Hanson presenting you with an exhibit and looking at a number of what we've referred to as the Hessler seven turbines?

A. Yes.

Q. And is it your recollection that five of those seven were included on Mr. Hanson's exhibit that he showed you?

A. Actually there were six.

Q. Six. Okay.

A. Yeah.

Q. And was the turbine that was not included CR 49? Is that correct?

A. Yeah. That's correct.

Q. Why was turbine CR 49 included in the -- again, loosely referred to as Hessler seven group of turbines?

A. I guess the table that I'm referring to doesn't have a note on that.

I need to take a quick look at my computer.

THE WITNESS: I'm sorry. It's going to take me a while to find that again. Maybe someone else on the team could get me some information about the history on that one.

Q. Mr. Haley, what was your objective in selecting the group of turbines that were included in what we call the

1 Hessler seven?

2 A. Well, I didn't select those. Those were selected by
3 Crowned Ridge. I just ran that model. But I did keep
4 track of which turbines were affecting which receptors,
5 but the table that I have I just -- turbine 49 was
6 included in the Hessler seven, and I don't recall the
7 particular reason why the CR team included it in that.

8 Q. And did the overall result of moving these turbines
9 increase or reduce the applicable sound levels at
10 receptors?

11 A. They reduced them.

12 MR. SCHUMACHER: No further questions at this
13 time.

14 I'm not sure whether or not we moved Exhibits
15 A1-H and A1-I that I believe Intervenors also had
16 objected to when I offered exhibits earlier, and I would
17 move those two at this time just to be sure they were
18 included.

19 MS. CREMER: I show them as having been
20 included.

21 MR. SCHUMACHER: Okay.

22 MS. CREMER: But to confirm, Intervenors.

23 MR. GANJE: The standing objection would apply.

24 MS. CREMER: All right. Thank you.

25 Staff.

1 MR. MIKAL HANSON: No objection.

2 MS. CREMER: They would be admitted if they
3 weren't before. Thank you.

4 MR. SCHUMACHER: Thank you very much. Nothing
5 further for this witness.

6 MS. CREMER: And can I just inquire as to the
7 table that Commissioner Fiegen wanted. Would that be
8 this afternoon? Tomorrow? Any idea?

9 THE WITNESS: Tomorrow morning.

10 MS. CREMER: Okay. Thank you.

11 Intervenors, did you have any recross as to
12 Commission questions or redirect?

13 MR. GANJE: I did. Thank you.

14 RECROSS-EXAMINATION

15 BY MR. GANJE:

16 Q. Mr. Haley, looking at Exhibit A57, A57, and I think
17 it's Bates -- let's look at Bates marked page number 1.
18 So it's Bates -- it's paged on the bottom. A57, the
19 table.

20 A. All right. I have it.

21 Q. Okay. Very good. Thank you.

22 Now this is a noise only table for Codington County;
23 correct?

24 A. No. This is for the entire project.

25 Q. Oh. This includes Codington and Grant?

1 A. Yeah. Grant is further down in the table.

2 Q. Indeed. Okay. Yeah. I was looking at the
3 Codington entries.

4 I think on the Codington entries you testified but I
5 want to make sure that's correct that you didn't do this
6 table based on the boundary lines. You, rather, did it
7 on structures and not the boundary line; correct?

8 A. That is correct.

9 Q. Okay. So that -- and this is not a final table?

10 A. This is a final table.

11 Q. Okay. Why didn't you use the Codington ordinance
12 boundary line protocol on this?

13 A. The purpose of Hessler's suggestions were to reduce
14 the sound levels at the homes. And so with that in mind,
15 there was no point in comparing the reduction at a
16 boundary line to his anticipated reductions at
17 structures.

18 Q. So are all the proposed movements that Staff is
19 apparently working on with Applicant, the so-called
20 Hessler seven turbines, are they based on that
21 presumption rather than the ordinance which sets a
22 property boundary line as the point of reference?

23 A. Yes. The point is is that Crowned Ridge went above
24 and beyond the ordinances by agreeing or setting a target
25 of reducing the sound noise levels at homes to 45 or less

1 for nonparticipants where that is not a requirement of
2 the ordinance.

3 So in going above and beyond in trying to match up
4 their turbine moves with Hessler's suggestions, the point
5 of comparison is that the structure has nothing to do
6 with the boundaries.

7 Q. Another point I think of your testimony to one of
8 the Commissioners was with regard to the question of
9 postconstruction sound survey and then comparing that to
10 the preconstruction -- what's commonly referred to as the
11 preconstruction ambient sound survey.

12 But I recall reading a report, I think, or part of a
13 report where you were involved and there was a
14 preconstruction ambient sound survey done by the
15 Applicant in that case and you were involved in the
16 postconstruction work.

17 So you have been involved in those type
18 circumstances?

19 A. No. I've never been involved in measurements. I
20 came into the realm of sound through the necessity of
21 wind farm design. Most people that do sound measurements
22 come to that profession by doing sound compliance for
23 highways and industrial sites and other things and, you
24 know, doing the measurements for permitting purposes.
25 That's not how I got into the sound business.

1 So, no, I have never done any sort of sound measure
2 work.

3 MR. GANJE: No further questions.

4 MS. CREMER: Thank you.

5 Staff.

6 MR. MIKAL HANSON: No further questions.

7 MS. CREMER: Certainly. Yeah. Go ahead.

8 COMMISSIONER FIEGEN: I'm assuming -- this is
9 Commissioner Fiegen. I'm assuming that the boundary
10 lines are in -- you're in compliance with the Codington
11 County ordinance?

12 THE WITNESS: Thank you. Yes. That's correct.
13 In fact, we were in compliance before we made the Hessler
14 drops, and any drops we made simply made those numbers
15 lower so there was no point to check for compliance.

16 The real question was what's the difference on
17 the structures.

18 COMMISSIONER FIEGEN: Perfect. That was my
19 assumption but just wanted to clarify before you got off
20 the stand.

21 Thank you.

22 THE WITNESS: Thank you.

23 MS. CREMER: Any further redirect?

24 MR. SCHUMACHER: Thank you. No.

25 MS. CREMER: Thank you. You may step down.

1 (The witness is excused.)

2 MS. CREMER: Well, at this time -- well, let me
3 ask my question first because I can do that.

4 Does anybody have questions for Mr. Hessler?

5 MR. MIKAL HANSON: Staff has none.

6 MS. CREMER: And, Mr. Ganje, you're indicating
7 none. The Commission has indicated none. And Crowned
8 Ridge has indicated none.

9 So based on that, I don't believe Mr. Hessler
10 needs to be called. But, Staff, did you want to add
11 something?

12 MR. MIKAL HANSON: We have a stipulated
13 postconstruction sound condition, and Staff is concerned
14 that maybe you'd want to ask Mr. Hessler some questions
15 about that condition so --

16 MS. CREMER: And I know -- I'm sorry.

17 MR. MIKAL HANSON: I'm the one that was trying
18 to get him off. I guess we're the one saying we should
19 probably have him be available.

20 COMMISSIONER NELSON: I just received this
21 proposed condition. If I had not received it, this was
22 going to be the genesis of my questions for Mr. Hessler
23 as to why this wasn't included in the original set of
24 proposed conditions.

25 I think my only question, and maybe you can

1 answer it, is this a mirror of the Hankard methodology?

2 It's different. Then I need to know what the --
3 I haven't studied it so I need to know what the
4 differences are. So yes.

5 MR. MIKAL HANSON: Could Staff be able to answer
6 that easier.

7 COMMISSIONER FIEGEN: And if we could just make
8 sure we're on the mics.

9 MR. KEARNEY: This is Darren Kearney of Staff,
10 and there were some tweaks of language in the methodology
11 section, the test methodology section from the Hankard
12 proposal.

13 It is consistent with the Hankard proposal as
14 far as the format from Deuel Harvest, but based on their
15 expert's position on how to do a sound study, we made
16 some slight adjustments. Those would be captured in
17 Subpart B of the condition.

18 And we also took out references of specific ANSI
19 standards. We just referenced generically that it shall
20 be conducted in compliance with ANSI standards. And
21 Crowned Ridge can add any other color if they think I
22 missed anything.

23 MR. MURPHY: Thank you.

24 Commissioner Nelson, from my study of past cases
25 here, I know this is of particular interest. My

1 suggestion would be to have Hessler on the phone so that
2 you can get those answered.

3 I do feel very comfortable that Mr. Hessler and
4 Mr. Lampeter had a meeting of the minds that we were
5 trying to improve upon, not trying to take away.

6 COMMISSIONER NELSON: I appreciate that. So
7 let's have him on and have him step through the changes.

8 MS. CREMER: So my understanding is we're going
9 to need just a few minutes here to hook him up to the
10 phone. So we'll take a short recess, but don't go far
11 because we'll start without you.

12 (A short recess is taken.)

13 (Mr. Hessler is connected via teleconference.)

14 MS. CREMER: Mr. Hessler, this is Karen Cremer.
15 I'm just going to remind you that you're under oath. And
16 there are a few questions that have been raised, and so I
17 will let Commissioner Nelson ask.

18 COMMISSIONER NELSON: Thank you, Mr. Hessler,
19 for accommodating us. I hope that you are learning lots
20 where you are at.

21 The question that I have relates to an exhibit
22 that has just been filed this morning entitled A63 and
23 this is an amendment to some proposed permit conditions
24 and this expounds or expands upon the methodology for
25 postconstruction noise measurement.

1 And the question that I posed to Staff here was,
2 well, is this the Hankard methodology, and the response I
3 got back was, well, it's close but it's been modified.

4 So my question for you is can you quickly
5 explain how this has been modified, and, in your opinion,
6 do those modifications improve the methodology or not?

7 THE WITNESS: Okay. The Hankard -- so-called
8 Hankard methodology relies on certain wind conditions
9 setting up that, in my experience, aren't all that common
10 or easily realized, and that is to be a valid
11 measurement, the turbines need to be operating at full
12 power or at a wind speed of about 7 meters per second at
13 hub height. And the wind speed at ground level needs to
14 be low.

15 And that doesn't always happen. It does happen
16 sometimes. But it might be difficult to capture data in
17 any seven- to 14-day period that captures a number of
18 samples under those conditions.

19 So in order to make the testing a little more
20 practical and to avoid having to extend the measurement
21 period or go back and measure again, what I've modified
22 is that during -- well, first of all, I've set the time
23 to be a 14-day period just to capture the maximum number
24 of measurements.

25 And then I've added that the -- that during the

1 testing when the project is operating at full power that
2 all the turbines be turned off for a 10-minute period,
3 irrespective of what the ground level wind speed is
4 doing. And I've specified that they do this 10 times.
5 So there will be at a minimum 10 samples taken when the
6 project is operating at full power.

7 And as long as the background level is
8 accurately quantified, you can get a valid answer. And
9 that's what this testing will do. Because during the
10 10-minute shutdown the level without the project will be
11 recorded under those -- all those wind conditions that's
12 happening at that moment, and then that level can be
13 accurately used to correct the total level measured just
14 before and just after that to get what the project is
15 doing.

16 The big challenge is separating the background
17 contamination from the actual project level. So this
18 makes it -- it assures that there will be a fair number
19 of good samples.

20 COMMISSIONER NELSON: Thank you. I appreciate
21 that explanation.

22 And just so I'm clear, what you are anticipating
23 here is that the on/off tests will be conducted
24 regardless of whether or not you have a sufficient number
25 of samples utilizing the regular methodology; is that

1 correct?

2 THE WITNESS: Yeah. That's correct. Because
3 you don't -- you won't really know until after the
4 survey's over and you go back and look for conditions
5 meeting the original criteria.

6 There may be many samples that are valid. There
7 may be few. But by adding this additional mandatory 10
8 shutdown tests, it will ensure that a good amount of
9 valid data is obtained irrespective of, you know -- it's
10 basically because you don't know until it's over of
11 whether you got enough or not. The other way.

12 COMMISSIONER NELSON: And I guess -- thank you.
13 I appreciate the explanation.

14 I guess the only other question, I know in past
15 dockets applicants have balked at the idea of shutting
16 their turbines off. Was that not an issue with this
17 Applicant?

18 THE WITNESS: The original test procedure
19 offered by the Applicant already included the proviso
20 that the turbines would be turned off to attain the
21 background level. That was already part of the offer.
22 And so presumably if they're willing to do that -- and
23 then in this modification I've limited the shutdown to
24 only a 10-minute period so that shouldn't be overly
25 onerous.

1 COMMISSIONER NELSON: Thank you. I think that
2 is all the questions I've got. And, again, greatly
3 appreciate your coming on the phone to explain those
4 changes.

5 THE WITNESS: Oh, sure. No problem.

6 MS. CREMER: And do either of the other
7 Commissioners have any questions for Mr. Hessler?

8 So he's Staff's witness. I would go to Crowned
9 Ridge. Did that raise any questions for you?

10 MR. SCHUMACHER: No. Thank you.

11 MS. CREMER: And Mr. Ganje?

12 MR. GANJE: No questions.

13 MS. CREMER: Staff, did you need any follow-up?

14 MR. MIKAL HANSON: No follow-up questions.

15 Thank you.

16 Thank you, Mr. Hessler.

17 MS. CREMER: Thanks, Mr. Hessler, and you may
18 step down.

19 THE WITNESS: Okay. Very good. Thank you.

20 (The witness is excused.)

21 MS. CREMER: Crowned Ridge.

22 MR. SCHUMACHER: Thank you. The Applicant would
23 call Rich Lampeter.

24 (The oath is administered by the court reporter.)

25

DIRECT EXAMINATION

1
2 BY MR. SCHUMACHER:

3 Q. Please state your name, business title, and company
4 for the record.

5 A. My name is Richard Lampeter. I'm an associate and
6 group manager of the acoustics group at Epsilon
7 Associates located in Maynard, Massachusetts.

8 Q. What is your role with regard to the Crowned Ridge
9 Wind Project?

10 A. My role has been to review and comment on the
11 testimony from David Hessler and the proposed conditions
12 from the Intervenor's regarding sound levels and
13 measurements.

14 Q. Please provide a short overview of your education
15 and experience.

16 A. I started working at Epsilon Associates in 2001
17 following my graduation at Lyndon State College in
18 Vermont where I earned a bachelor's of science and
19 environmental science.

20 Since 2004 I've been involved in wind energy
21 projects across the United States, and during that time
22 I've worked on approximately 90 such projects. My role
23 on these projects has been primarily to conduct shadow
24 flicker and sound level analyses.

25 In addition to my experience in wind energy

1 projects, I've also conducted sound level analyses for
2 other types of power generating facilities, commercial
3 developments, and industrial facilities. And those
4 analyses have involved -- and I've either conducted or
5 managed these types of analyses -- either preconstruction
6 sound level measurement programs, sound level modeling,
7 noise mitigation and noise control analyses, and
8 postconstruction sound level evaluations.

9 Q. Did you file Prefiled Rebuttal Testimony on May 24,
10 2019, that is marked as Exhibit A41 and accompanying
11 exhibits marked as A41-1, A41-2, A41-3, and A41-4?

12 A. Yes, I did.

13 Q. Do you have any changes or corrections to that
14 testimony or the exhibits?

15 A. No, I do not.

16 Q. Please provide a short summary of your prefiled
17 testimony.

18 A. My testimony includes my opinion on preconstruction
19 sound level measurements and that it's specific to
20 Crowned Ridge, and my opinion is that they're not
21 necessary. And that's because the collection of baseline
22 or ambient sound levels would not aid or be required as
23 part of evaluating the county sound level limits.

24 In addition, an evaluation of an increase over
25 background sound levels is problematic for a variety of

1 reasons, which I've outlined in my testimony in that that
2 type of limit creates uncertainty for the owner,
3 operator, and developer, as compared to a project only
4 sound level limit.

5 The other part of my testimony was to comment on the
6 proposed conditions by the Intervenor with respect to
7 sound. And to summarize those, I feel that the inclusion
8 of infrasound is unnecessary based upon the findings of
9 the Massachusetts wind turbine health impact study, along
10 with other studies that I reference in my testimony, one
11 of which I was a co-author on.

12 I did not agree with the recommendation for
13 monitoring sound levels during maintenance activities or
14 construction activities, as those activities would be
15 brief and/or intermittent in nature. And also there's
16 not a limit to compare those sound levels to.

17 Finally, the postconstruction measurement
18 methodology that was proposed is inconsistent with the
19 county sound limits. From a location and frequency
20 perspective, it's unnecessary and atypical as compared to
21 other types of programs, and the sound level metric
22 proposed is inappropriate for these types of
23 measurements. So, therefore, I would not recommend any
24 of the conditions that were proposed by the Intervenor
25 with respect to sound.

1 MR. SCHUMACHER: Applicant has no further
2 questions for this witness and would tender him for
3 cross-examination.

4 MS. CREMER: Thank you.
5 Intervenors.

6 MR. GANJE: No questions.

7 MS. CREMER: Thank you.
8 Staff.

9 MR. MIKAL HANSON: We do have a few.

10 CROSS-EXAMINATION

11 BY MR. MIKAL HANSON:

12 Q. You are the postconstruction sound measurement
13 person, expert; is that correct?

14 A. Yes. That's correct.

15 Q. And how many would you -- how many postconstruction
16 sound studies do you estimate you've probably been
17 involved in?

18 A. I would estimate about 20.

19 Q. And in almost all of those 20, were there modeling
20 sound done before the construction in those projects or
21 at least a significant number of those projects?

22 A. I would say the more recent projects, yes, that
23 modeling was a component of the preconstruction analysis.

24 Q. How do they compare? Is the premodeling a pretty
25 good predictor on postconstruction sound?

1 A. I would say since I've been doing it for quite a few
2 years, I've seen sort of the development of the industry.
3 So early as projects were being developed and modeled,
4 there was greater inconsistency with the modeling inputs,
5 and you would see typically some more aggressive types of
6 modeling analyses which would not show necessarily the
7 best agreement with a postconstruction measurement
8 program.

9 Over time and as more studies have been done, those
10 modeling inputs have become more standardized, not --
11 there's still some variation, but there's a higher degree
12 of confidence in those levels, and you would expect
13 compliance done with typical modeling assumptions.

14 Q. Mr. Haley said he's using a software to model. Are
15 you familiar with that software?

16 A. Yes. I'm familiar with the WindPRO software
17 package.

18 Q. And is that the more recent and it's been working
19 pretty well, in your opinion?

20 A. Well, WindPRO is one of the software packages. And
21 these packages incorporate international standard
22 ISO 9613-2.

23 Q. Slow down a little bit.

24 A. Oh. Sorry. And so when you use that standard there
25 still are some inputs that are user driven. So you can

1 still use that software package, and that has been used
2 in the past. But if you make the wrong assumptions, then
3 you can even with that software get sound levels that are
4 either very close or could underpredict. It really
5 depends on the inputs you put into that software.

6 Q. You were involved in Exhibit A63, the condition for
7 postconstruction sound? I'm going to show you a copy.
8 You have a copy?

9 A. They passed it around.

10 Q. Okay. You were involved in helping to agree to that
11 condition, were you not?

12 A. Yes, I was.

13 Q. And to your expert -- in your expert opinion, that
14 is a proper way to do the postconstruction sound?

15 A. I think every consultant has some variations in what
16 they think may be best. So there are certainly some
17 aspects here that I would prefer maybe a slightly
18 different approach, but I would say that the intent in
19 how it's laid out is a reasonable and workable
20 methodology.

21 I think there's still a challenge in getting the
22 number of measurements that are required, but the
23 approach that's laid out is workable and reasonable.

24 Q. And you're aware Crowned Ridge has stipulated and
25 agreed to do that?

1 A. Yes, I am.

2 Q. Are you aware that some counties or municipalities
3 or wherever these wind farms are built sometimes have a
4 wind ordinance that says whatever the sound is now, it
5 can't be increased over 5 dBs? Or, you know, their sound
6 ordinance starts at a level and then adds?

7 A. Right. There are some ordinances that set an
8 increase over background for dBA levels. I would say
9 that quite a few of those are ones where they set a
10 limit, a project only limit, and then if background is
11 above that, then there's the delta for that particular
12 situation.

13 So it's kind of a combination, but some are also
14 just stand-alone increase over background type noise.

15 Q. And an ambient sound study has to be done. That's
16 the situation where you need to do an ambient sound
17 study?

18 A. Right. If you have a situation where your only
19 limit is increase over background, you would want to
20 obviously collect that background in advance.

21 Q. And we don't have that situation here?

22 A. That is correct.

23 MR. MIKAL HANSON: I don't have any other
24 questions.

25 MS. CREMER: Thank you.

1 Commissioner Hanson. Or Chairman Hanson.

2 CHAIRMAN HANSON: Thank you.

3 Good afternoon.

4 THE WITNESS: Good afternoon.

5 CHAIRMAN HANSON: I was just reviewing your -- I
6 didn't expect to get to you yet. I thought we'd be a
7 little bit longer.

8 Do you find yourself in disagreement with any of
9 Mr. Haley's or Mr. Ollson's testimony?

10 THE WITNESS: Their written testimony?

11 CHAIRMAN HANSON: Yes.

12 THE WITNESS: I haven't reviewed either
13 Mr. Ollson's or Mr. Haley's testimony.

14 CHAIRMAN HANSON: You didn't read their
15 testimony?

16 THE WITNESS: No, I haven't.

17 CHAIRMAN HANSON: Really. Okay. Is that to
18 protect you so you don't have to answer a question like
19 that?

20 THE WITNESS: No. I've looked over Mr. Haley's
21 reports. I've read through those to become familiar with
22 the project and what the predicted sound levels are --

23 CHAIRMAN HANSON: All right.

24 On page 7 of your written -- let's see. This
25 would be your Rebuttal Testimony. I guess that's the

1 only one that you had. On line 17 that type of an answer
2 is the type of an answer I don't give any weight to. I
3 don't particularly like it because it doesn't address the
4 question.

5 You state that you're "unaware of any state or
6 county limit on sound during decommissioning; therefore,
7 the monitoring of sound during this temporary condition
8 would be unnecessary." But that's not the question.

9 The question is do you agree that sound
10 monitoring, including infrasound, should be completed
11 during decommissioning? Do you know of any
12 decommissioning that has ever taken place?

13 THE WITNESS: Yes.

14 CHAIRMAN HANSON: And do you know if anyone did
15 any sound testing?

16 THE WITNESS: I'm not aware of any sound testing
17 during that.

18 CHAIRMAN HANSON: Have you any idea of the
19 volume of the sound? Chatted with anybody about it or
20 been there and observed it or anything of that nature?

21 THE WITNESS: No. I would assume it would be
22 similar to the construction activities where they erect
23 the wind turbines and pour the foundations and --

24 CHAIRMAN HANSON: And I suspect it would take a
25 shorter time to do than erecting it. Any --

1 THE WITNESS: I'm not sure of the time line on
2 it.

3 CHAIRMAN HANSON: I'm just curious -- forgive me
4 for talking over you.

5 THE WITNESS: Sorry.

6 CHAIRMAN HANSON: I tell people not to do that.

7 I'm just very curious about that. Not that I
8 think that we -- some of my questions are more to my
9 curiosities than to what we should be monitoring or
10 regulating.

11 THE WITNESS: Usually -- I would assume
12 decommissioning would fall under a similar type of
13 conditions as a construction where you use best
14 management practices to limit time durations for the
15 construction or -- is the main way to mitigate any sound
16 concerns as to -- the activity, unlike the operation, is
17 going to be moving so there will be different areas where
18 there's going to be activity, and it's temporary so it's
19 there for a period of time and then that piece of
20 equipment either stops operating or moves on to the next
21 spot.

22 CHAIRMAN HANSON: And you're not a sound guy
23 from the standpoint of giving opinions on infrasound and
24 such and effects?

25 THE WITNESS: I can. Because one of the papers

1 that I referenced in my testimony we did one of the
2 earlier sound level measurement programs to look at
3 infrasound and low frequency sounds from wind turbines
4 and compared them to different criteria, some of the ANSI
5 criteria, some of them international criteria.

6 And we did a literature review. I was a
7 co-author on this peer-reviewed journal article where we
8 did a literature review of what the studies were to date,
9 both also looking at what criteria might be available for
10 us to compare to. And then we went and did a measurement
11 program and looked at two wind turbines at this
12 particular facility, monitored those sound levels at
13 1,000 feet from operating wind turbines, and then
14 compared them to the criteria.

15 CHAIRMAN HANSON: Interesting.

16 So would you have an opinion on whether a sound
17 level of 45 dBA or less would have absolute universally
18 no effect on the health of all human beings?

19 THE WITNESS: That's a pretty broad statement to
20 have. I'm not a health expert. But what we have seen
21 through the literature reviews we've done and when you
22 look at things such as sleep disturbance, 45 decibels is
23 definitely a very good number to have as a limit to
24 prevent things like sleep disturbance, which is usually
25 the major concern at a residence.

1 CHAIRMAN HANSON: So would you agree that
2 45 decibels or less of noise would have no effect on
3 sleep disturbance or the health of human beings?

4 THE WITNESS: Yes. I would say that that's an
5 accurate statement.

6 CHAIRMAN HANSON: Curious. Thank you.

7 THE WITNESS: You're welcome.

8 CHAIRMAN HANSON: Thank you.

9 COMMISSIONER NELSON: Mr. Lampeter, thank you
10 for coming out here to help us sort this out.

11 You heard my discussion this morning with
12 Mr. Haley, and his modeling as recorded on Exhibit A58
13 shows that at a particular receptor the sound level
14 increases by one half of the dBA from wind turbines that
15 would be located 20 to 25 miles away.

16 Does that make sense to you given your
17 experience with how sound travels from wind turbines?

18 THE WITNESS: I'd have to stare a little bit
19 closer at the modeling to have a definitive answer. But
20 what I can say is that if you had all of the wind
21 turbines a significant distance, very far away from a
22 particular receptor, you could see a small increase. But
23 those numbers would have to be very low.

24 I would expect that if there were turbines
25 significantly closer than that in the modeling already, I

1 would not anticipate seeing any increase at a modeling
2 receptor when you add a turbine 20 miles away.

3 COMMISSIONER NELSON: Thank you. No further
4 questions.

5 COMMISSIONER FIEGEN: Thank you for joining us
6 in South Dakota. Kristie Fiegen.

7 You were asked about your participation in pre
8 and postconstruction modeling, and you talked about how
9 earlier in the earlier years they were a little more --
10 there may have been developers that were a little more
11 aggressive.

12 When you state that do you mean like it appears
13 this project is being conservative. Do you mean
14 aggressive means opposite of conservative?

15 THE WITNESS: Yes. And I wouldn't
16 necessarily -- it was the developers that were advocating
17 perhaps for that type of differences in modeling inputs.
18 They may or may not. I don't know.

19 But some consultants would, let's say, perhaps
20 not use a conservative ground attenuation factor. Maybe
21 they would use a different factor that would result in
22 more reductions in the sound levels model at a home so
23 you would get a lower number in the model, which would
24 not verify through a measurement program. So by making
25 or not including an uncertainty factor from the

1 manufacturer the plus 2 that you mentioned.

2 So if you tweak those numbers, in certain
3 instances you could exceed, perhaps, the modeled number
4 when you take a measurement.

5 COMMISSIONER FIEGEN: So I have a note here that
6 you were asked approximately you've been involved in
7 maybe about 20 of the postconstruction surveys; is that
8 correct?

9 THE WITNESS: That's correct.

10 COMMISSIONER FIEGEN: Okay.

11 So out of those 20, especially I don't know what
12 you would call most recent. Is that most recent would be
13 the past six years or the past 10? I don't know. What's
14 that 20 years -- I mean, what's the span of years?

15 THE WITNESS: So I started -- the first
16 postconstruction program would have been in 2004.

17 COMMISSIONER FIEGEN: Okay. So less than 20
18 years.

19 THE WITNESS: Yes.

20 COMMISSIONER FIEGEN: So probably -- let's just
21 look -- if you can, in your mind, look at the more
22 recent -- maybe the last eight years or 10 years or
23 whatever the case is.

24 Can you give me the worst-case scenario or the
25 worst case in the last eight or 10 years of pre and post

1 and give me examples of what actually happened in some of
2 that post compared to what the pre was, the analysis of
3 the preconstruction and then the postconstruction and
4 then the variance.

5 Were the variances 2 decibel dBA or --

6 THE WITNESS: The postconstruction programs
7 often are not designed in a way to evaluate the model.
8 They're more designed to evaluate compliance.

9 So the subtle difference there is that if the
10 limit is, let's say, 50 decibels. You can measure the
11 sound levels with contributions from background sound or
12 wind, and you may measure a sound level that comes in at
13 48 decibels, which would still show compliance in this
14 particular example but your model predicted 46. So you
15 may exceed it, but you don't take it the next step to
16 determine has the model been done correctly because it
17 complies and that was the closest location and there's no
18 reason necessarily to take it further than that and
19 you've demonstrated compliance.

20 In other instances where the modeling is right
21 at the limit, I have had a situation where it was above
22 that limit, but we're talking about a decibel in that
23 particular instance.

24 So usually the model, even if it's done what I
25 would have said more aggressive or did not include all

1 the conservatism, often the difference between modeled
2 and measured would be small.

3 COMMISSIONER FIEGEN: So if I'm hearing your
4 testimony correctly, like the last eight to 10 years
5 there was only one tower that was over?

6 THE WITNESS: There were two. I just gave
7 you --

8 COMMISSIONER FIEGEN: There were two.

9 THE WITNESS: Yeah. Both were about a decibel.

10 COMMISSIONER FIEGEN: And do you remember if
11 that level was at 50 dBA? Or do you know what level
12 those were at, or you just remember that you had two that
13 were over by one decibel?

14 THE WITNESS: Yes.

15 COMMISSIONER FIEGEN: Okay. Thank you.

16 THE WITNESS: Yes. I think -- well, I'm not
17 100 percent sure so I'd rather not say.

18 COMMISSIONER FIEGEN: Okay. Thank you. But
19 that's helpful to realize that you've been involved in
20 20, and especially the most recent ones there were two
21 towers.

22 Thank you.

23 THE WITNESS: You're welcome.

24 MS. CREMER: Any redirect, Crowned Ridge?

25 MR. SCHUMACHER: No redirect from the Applicant.

1 Thank you.

2 MS. CREMER: Thank you.

3 Mr. Ganje, did you have any recross as to
4 Commission questions?

5 MR. GANJE: None.

6 MS. CREMER: Thank you.

7 Staff.

8 RECROSS-EXAMINATION

9 BY MR. MIKAL HANSON:

10 Q. Should the Commission be concerned about -- there
11 are a number of nonparticipants right at 45 dBAs. Should
12 they be concerned that they're right up there at the
13 level that the county ordinance is?

14 A. I thought they were -- I thought most of them were
15 lower than 45. I don't remember how many were close.
16 But I think with the additional uncertainty that's been
17 added into the modeling here, you have the 2 decibel
18 uncertainty and a lot of the modeling inputs that were
19 described by Jay that I wouldn't have concern with
20 respect to compliance.

21 MR. MIKAL HANSON: Thank you. No other
22 questions.

23 MS. CREMER: Does that raise any final
24 redirect -- or -- yes.

25 MR. SCHUMACHER: We do not. Thank you.

1 MS. CREMER: All right. You may step down.
2 Thank you.

3 THE WITNESS: Thank you.

4 (The witness is excused.)

5 MS. CREMER: Please call your next witness.

6 MR. MURPHY: Thank you. I call Dr. McCunney.

7 (The oath is administered by the court reporter.)

8 DIRECT EXAMINATION

9 BY MR. MURPHY:

10 Q. Hello. Please state your name, business title, and
11 company for the record.

12 A. My name is Dr. Robert J. McCunney. I'm a physician.
13 I practice in Boston at the Brigham and Women's Hospital,
14 which is the flagship hospital of Harvard Medical School.

15 Q. What is your role with Crowned Ridge Wind?

16 A. I was asked as a consultant to review documents that
17 have been submitted in this case to address potential
18 health-related issues associated with the project.

19 Q. Please provide a short overview of your education
20 and experience.

21 A. I have a bachelor's degree in chemical engineering
22 from Drexel University. I have a master's degree in
23 environmental health from the University of Minnesota. I
24 have a medical degree from Thomas Jefferson University
25 Medical School in Philadelphia. I trained in internal

1 medicine at Northwestern University Medical Center in
2 Chicago. And I did a fellowship in occupational and
3 environmental medicine at the Harvard School of Public
4 Health in Boston.

5 Q. Did you file Prefiled Rebuttal Testimony on May 23,
6 2019, that is marked as A40 and accompanying Exhibits
7 A40-1 through A40-9?

8 A. Yes, sir.

9 Q. Do you have any corrections or changes to that
10 testimony or exhibits?

11 A. No.

12 Q. Please provide a short summary of your prefiled
13 testimony.

14 A. Based upon my review of the documents and testimony
15 introduced in this case, there are no health or welfare
16 concerns associated with the project as proposed by
17 Crowned Ridge.

18 The turbine placement and setbacks will not
19 adversely affect the health or welfare of
20 nonparticipants.

21 I base this conclusion on three major factors: The
22 sound and shadow flicker results developed by CRW witness
23 Jay Haley; two, my professional experience as a physician
24 addressing health risks from noise; and, three, the
25 scientific peer-reviewed literature.

1 Although reports suggest that some people living
2 near wind turbines may find the noise annoying, it is
3 important to point out that individual factors play a
4 significant role in why people report annoyance in
5 addition to noise.

6 In fact, noise has been shown in research studies to
7 be a minor factor in why some people living near wind
8 turbines report annoyance. Attitudes toward wind energy,
9 potential economic benefits, and visual aspects of the
10 turbines have been shown to be more important than noise
11 in why people report annoyance.

12 Annoyance, it's important to point out, is not an
13 adverse health effect, and it is not coded as a specific
14 diagnosis in the latest version of the international
15 classification of diseases. The ICD is used worldwide
16 for diagnostic, insurance, and research purposes. In
17 fact, everybody in this room when you go to a physician
18 and the physician completes the evaluation and prepares
19 the report, the ICD code has to be listed for insurance
20 purposes. So the international classification of
21 diseases does not list annoyance as an adverse health
22 effect.

23 Although wind turbines can generate infrasound and
24 low frequency sound, detectable levels of infrasound and
25 low frequency sound at residences near wind turns are not

1 at harmful levels. And these conclusions are based on
2 studies in the United States, the United Kingdom, the
3 Netherlands, Denmark, and Australia, among others and
4 mostly notably Germany.

5 No studies demonstrate harmful effects to people
6 from exposure to infrasound or low frequency sound at the
7 noise levels measured in the vicinity of wind turbines
8 or, frankly, in experimentally designed studies that
9 involved noise levels several orders of magnitude higher
10 than those noted in the vicinity of wind turbines.

11 And, furthermore, it is not necessary to
12 differentiate low frequency sound or infrasound from
13 broad noise level measurements conducted in the A scale.

14 And, finally, in conclusion, in my view
15 nonparticipants will not suffer adverse health effects,
16 including sleep disturbance, at noise levels up to 46
17 decibels.

18 That concludes my brief summary.

19 MR. MURPHY: Thank you. I offer the witness for
20 cross-examination.

21 MS. CREMER: Thank you.

22 Intervenors.

23 MR. GANJE: No questions.

24 MS. CREMER: Thank you.

25 Staff.

CROSS-EXAMINATION

BY MS. EDWARDS:

Q. Dr. McCunney, you just mentioned one of the annoyance effects as being potential economic benefit. What do you mean by that?

A. Well, it's in any research study when there is what we call a health outcome measurement. For example, if we want to to determine what the cause of heart disease is and we know that there are various factors such as cholesterol, high blood pressure, diabetes, family history, cigarette smoking, et cetera, what is used in research studies is a method called multiple regression analysis, which may sound complicated, but it's a method designed to determine which of the various factors that can cause the outcome of interest and in this case heart disease is most important.

Well, similar methods are used when annoyance is found in the context of research studies of people living in the vicinity of wind turbines. So similar multiple regression analyses were conducted in numerous studies to determine what's the most important factor as to why people report annoyance when they live near wind turbines?

And factors that are more important than noise include the attitudes that people may have towards wind

1 turbines, whether they develop economic benefit, the
2 visual aspects, and so forth.

3 And when I say "economic benefit" I mean research
4 studies have shown that the people who develop economic
5 benefit from the wind turbines do not report annoyance.
6 In fact, there's a recent study just published last year
7 by the lead investigator of the Health Canada Study about
8 which you may have heard already. People who derive
9 economic benefit from the turbine don't simply report
10 annoyance. That's what I meant by that comment.

11 Q. Okay. I wasn't sure if you were getting at it's a
12 shakedown or where you were coming from. Okay. So that
13 clarified. Thank you.

14 A. No.

15 Q. And you've also testified in your written testimony
16 that you've never testified before this Commission. Have
17 you testified before another commission or a similar
18 body?

19 A. Not near here. No, I haven't. I've testified in
20 other jurisdictions I've indicated in Canada and in the
21 U.S., but not in this area.

22 Q. Okay. On page 5 of your prefiled testimony you
23 state the Health Canada Study -- the largest epidemiology
24 study in the world found no adverse health effects and so
25 on at noise levels up to 46 dB.

1 Has it been studied, to your knowledge, above 46 dB?

2 A. Well, there are studies, all kind of environmental
3 noise studies, that have been conducted worldwide for all
4 sources of noise sources, whether it's airports or
5 railroads or transportation noise, construction noise,
6 and so forth. And some of those investigations do
7 address noise levels well into the mid 50s.

8 Q. So by that statement are we to take that to mean
9 that there could be effects over 46 or that we don't
10 know?

11 A. Well, there are studies. If you look at the more
12 recent World Health Organization document that was
13 promulgated and released about a year ago, they will
14 actually allow levels up to the mid 50s, if I remember
15 right, 53 decibels for some sources of noise.

16 So that's an indirect way of answering your
17 question. I find that it would be unlikely to be adverse
18 health effects from 45 to 50 although research
19 demonstrates pretty conclusively, at least in my view,
20 that up to 46 is safe with respect to wind turbines.

21 MS. EDWARDS: Thank you. No further questions.

22 MS. CREMER: Thank you.

23 Commissioner Nelson.

24 COMMISSIONER NELSON: No questions.

25 MS. CREMER: Commissioner Fiegen.

1 COMMISSIONER FIEGEN: Thank you for coming. Can
2 I be off the record a second.

3 (Discussion off the record.)

4 COMMISSIONER FIEGEN: So you are the expert for
5 the Applicant on health; is that correct?

6 THE WITNESS: That's my understanding, yes.

7 COMMISSIONER FIEGEN: Okay. So have you been
8 involved personally in any studies studying wind
9 developments and health?

10 THE WITNESS: Well, yes. I'm the author of at
11 least four publications, one of which is in press.
12 They're listed in my CV. If you'd like me to list them
13 and go over them now, I can.

14 COMMISSIONER FIEGEN: And have you evaluated
15 residents that live by wind farms? Have you evaluated
16 them on a health issue before?

17 THE WITNESS: Yes.

18 COMMISSIONER FIEGEN: Okay. Thank you. Those
19 are my questions. Thanks.

20 CHAIRMAN HANSON: Good morning.

21 THE WITNESS: Good morning.

22 CHAIRMAN HANSON: Welcome to South Dakota.

23 THE WITNESS: Thank you.

24 CHAIRMAN HANSON: Would you agree that the
25 presence of wind turbines annoys some people?

1 THE WITNESS: Yes.

2 CHAIRMAN HANSON: Would you agree that the sound
3 annoys some people?

4 THE WITNESS: Well, in some cases as I tried to
5 indicate earlier, Commissioner, sound is one of the
6 factors that may cause people or noise -- however you
7 want to define the term, can affect some people in terms
8 of reporting annoyance. But it tends to be a minor
9 factor in terms of other factors that cause people to
10 report annoyance.

11 CHAIRMAN HANSON: Would you agree that persons
12 who are economically benefited from the presence of wind
13 turbines are more likely to tolerate the annoyance?

14 THE WITNESS: Well, that's assuming they have
15 annoyance that they may be better to tolerate it. I'm
16 not sure they're annoyed. I mean, I've talked to many
17 people who live close to wind turbines, and they're not
18 annoyed at all.

19 CHAIRMAN HANSON: Well, at least that's what
20 these studies that we've been reading and that are
21 throughout our information arrive at that conclusion.
22 But there are different conclusions that can be reached
23 by looking at the same -- let's see. The same criteria,
24 I'll say.

25 You know, some people can look at that and say,

1 well, gosh, the self-reporting is less among those folks
2 who are economically benefited and yet it's greater among
3 obviously those people who are not economically
4 benefited; therefore, we can conclude that people who are
5 not -- are not economically benefited are annoyed more
6 than the others.

7 Or we can conversely say that those people who
8 are economically benefited are going to tolerate it more.
9 They're going to say, hey, I'm getting paid for this and
10 I signed up for it so I'm not going to complain. I'm not
11 going to self-report.

12 THE WITNESS: Well, it's certainly a
13 possibility, but in my view it's less likely. The other
14 explanation -- you've heard a little bit about Health
15 Canada. One of the advantages of Health Canada in
16 addition to the subjective information that was obtained
17 from the questionnaire, there was a lot of objective
18 information that was obtained as far as the study, for
19 example, measurement of cortisol levels through monitor
20 of stress, measurement of blood pressure, measurement
21 actually of objective findings associated with sleep
22 disturbance.

23 So you make a good point about subjective
24 assessments, and that, in my view, was supplemented at
25 least in the Health Canada Study by the objective

1 measurements.

2 CHAIRMAN HANSON: Should we ignore -- should we
3 ignore the fact that -- or the health effects that -- I
4 don't know how to phrase this because there's -- I've
5 read all of the information, and they're continually
6 saying that there's no health effects whatsoever.

7 And I recognize that people can become
8 accustomed to noise and such. And I shouldn't bring my
9 own personal experiences of different people that -- you
10 know, it's not evidence.

11 But intuitively it would just seem that
12 especially if I haven't signed up for wind turbines to be
13 on adjacent property and I do hear the noise and the
14 flicker is based upon receptors of windows in -- and
15 interior and I'm sitting on my porch and I hear better on
16 my front porch and I've got the flicker on my front porch
17 but not inside, it would just seem that that would annoy
18 me a lot more if I'm not making \$20,000 or however much.

19 THE WITNESS: Well, the research would support
20 your perspective.

21 CHAIRMAN HANSON: So that high blood pressure
22 and those other concerns -- high blood pressure's the
23 silent killer, and you're testifying that it can have an
24 effect on high blood pressure by those persons that are
25 being -- so how do we not ignore -- that's a health

1 effect, isn't it?

2 THE WITNESS: I'm not sure I understand your
3 question. What is a health effect? Annoyance?

4 CHAIRMAN HANSON: Annoyance that causes my high
5 blood pressure, which I take pills for. Doesn't that
6 create a health effect?

7 THE WITNESS: Well, it's assuming that the
8 annoyance is leading to high blood pressure or elevations
9 in the blood pressure. I'm not sure it always does.
10 Noise means -- as you know, means different things to
11 different people. And annoyance, per se, does not
12 necessarily mean the blood pressure will increase.

13 CHAIRMAN HANSON: I like your statement that
14 annoyance has different effects on different people.
15 Because we're talking about thousands and thousands of
16 people. And start looking at the odds and, you know,
17 we're supposed to protect everybody.

18 THE WITNESS: Ideally, yes.

19 CHAIRMAN HANSON: Well, that's our job.

20 So if people are annoyed and it creates high
21 blood pressure -- I know how it affects some people with
22 ADHD and things of that nature but -- I'll ask you.

23 You're certainly a well versed individual with a
24 heck of a background. Special needs kids, you would seem
25 to be capable of answering a question on stimulus from

1 shadow flicker and noise on special needs kids.

2 Isn't there some effect in that area?

3 THE WITNESS: Well, I've been asked this
4 question before in other settings, whether wind turbine
5 noise may aggravate, for lack of a better word, or to
6 affect the well-being of people with autism; for example,
7 the Asperger syndrome. I've been asked to address
8 whether cardiac pacemakers may be affected, so forth.

9 So in the course of my 10 years, the last
10 10 years when I've paid attention to potential health
11 implications of wind turbine operations, in my view it
12 shouldn't be affecting those children.

13 With respect to autism in particular, I had some
14 discussions with the director of Children's Hospital in
15 Boston about this particular issue after looking at the
16 literature myself to get the perspective of a clinician
17 who actually treats patients such as these -- because I
18 don't really treat people with autism or Asperger's in my
19 practice. So I sought out consultation with a physician,
20 director of the department who does.

21 And he reassured me that the literature that I
22 had reviewed was pretty much indicative of lack of effect
23 with children with these special needs.

24 It's all based on noise levels, as you know. I
25 mean, the noise levels can get pretty high with airplanes

1 and so forth and construction. So it's all -- like any
2 type of occupational or environmental hazard, it's the
3 dose that makes the poison, meaning how high and how long
4 the exposure is.

5 Everybody here knows that one cigarette is not
6 going to cause you to get lung cancer. But smoke two or
7 three packs a day for 30 years, really increase your
8 risk. It's the same thing with any hazard. The higher
9 the levels, the greater the risk.

10 CHAIRMAN HANSON: Thank you. I just struggle
11 with absolute statements like there is absolutely no
12 health detriment to anybody on 45 dBA or on flicker or,
13 you know, so many hours. I struggle with those types of
14 absolutes. Because I know everyone in this room is
15 different, and it's going to affect everyone in this room
16 differently. And I appreciate your being here because I
17 place a lot of weight on your testimony.

18 So you're telling me that annoyance can
19 create -- from your experience and your information, we
20 don't have to worry about Asperger's or any other
21 childhood challenges, that it's a nonfactor here.

22 THE WITNESS: Yes. In my view based on the
23 experience that I've gained over the last 10 years
24 addressing this issue.

25 And, first of all, let me agree with you

1 completely. I'm always very concerned about categorical
2 comments, categorical statements. Because, as we say in
3 medicine, never is never true and always is always wrong,
4 to use the cliché.

5 But you have to make decisions based on the best
6 available information. And I am very impressed with the
7 Health Canada Study. Even within the results of the
8 Health Canada Study when they tried to segment out those
9 who reported annoyance as to whether they had adverse
10 health effects or they did not.

11 CHAIRMAN HANSON: Thank you very much, Doctor.
12 Appreciate your testimony.

13 THE WITNESS: My pleasure. I appreciate the
14 opportunity to be here.

15 COMMISSIONER FIEGEN: I have one follow-up
16 question that Mr. Hanson talked about special needs kids.
17 And I had the opportunity to teach three on Sunday, and
18 all of them had headphones, and at one point they went
19 and got their head phones and put them on, which was
20 interesting to me.

21 So I asked you earlier if you've evaluated
22 residents that live by wind turbines. Any of the people
23 that you evaluated, were there any diagnosis of autism,
24 and did you evaluate those people?

25 THE WITNESS: No. There were no autism

1 diagnoses.

2 COMMISSIONER FIEGEN: Okay. Thank you.

3 MS. CREMER: Any redirect?

4 MR. MURPHY: No redirect.

5 MS. CREMER: Thank you.

6 Intervenors, any questions based on Commission
7 questions?

8 MR. GANJE: No questions.

9 MS. CREMER: Thank you.

10 Staff.

11 MS. EDWARDS: Briefly.

12 RECROSS-EXAMINATION

13 BY MS. EDWARDS:

14 Q. So is it fair to say that different doctors have
15 different areas of expertise?

16 A. Well, certainly. There's a whole range of
17 specialties. I think there now have been 24 different
18 specialties.

19 Q. So would you consider epilepsy within your area of
20 expertise?

21 A. Well, epilepsy is usually managed by neurologists.
22 However, one of the beauties that -- what I really like
23 about my field, although I trained in internal medicine,
24 I've really been focusing my entire career on
25 occupational and environmental medicine. I have to learn

1 a little bit about a lot of diseases because I have to
2 know, for example -- you brought up epilepsy.

3 Earlier in my career I had to evaluate commercial
4 drivers as to whether they could have a license to drive
5 a big semitruck and they may have epilepsy. That forced
6 me to learn about epilepsy in more detail perhaps than a
7 general physician, engage with neurologists to try to
8 make informed decisions.

9 So the direct answer is I'm not a neurologist. I
10 don't usually primarily treat epilepsy, but some of my
11 patients have epilepsy. See the difference? They may
12 be treated by a neurologist, but I see them for something
13 else.

14 Q. Sure. How about ADHD?

15 A. I don't usually treat ADHD. That's usually --
16 mostly in pediatrics but some psychiatry for adults.
17 Some adults have ADHD.

18 Q. So are you able to opine -- and I'm not going to ask
19 you to, but are you able to opine on the effects or -- if
20 any, of wind turbines on children with ADHD?

21 A. I'd certainly be willing to take on that task as I
22 approach every other challenge posed to me and that is to
23 evaluate whether exposure to any potential hazard -- and
24 noise clearly is a potential hazard. How to evaluate the
25 effect of a potential hazard on human health.

1 It's what I do in my clinical practice. When people
2 come to see me they're either concerned they have a
3 health issue that may be related to some exposure to a
4 hazard of some sort or they have been exposed to a
5 hazard. They're renovating their attic and they find
6 asbestos or there's lead in the drinking water or
7 something like that. That is the essence of my medical
8 practice, as is evaluating whether exposure to a hazard
9 affects human health or whether a health condition may
10 have been aggravated by exposure to a hazard. Usually
11 one or the other.

12 Q. Have you ever seen either of those health
13 conditions, epilepsy, ADHD and let's throw in autism,
14 affected by wind turbines in your practice?

15 A. No.

16 MS. EDWARDS: Okay. Thank you. No further
17 questions.

18 MS. CREMER: Any final redirect?

19 MR. MURPHY: No. Thank you.

20 MS. CREMER: Thank you for coming.

21 THE WITNESS: Thank you very much. It's a
22 pleasure to try to be of help. Thank you.

23 (The witness is excused.)

24 MS. CREMER: Crowned Ridge, you can call your
25 next witness.

1 MR. MURPHY: Thank you. I call Dr. Ollson.

2 (The oath is administered by the court reporter.)

3 DIRECT EXAMINATION

4 BY MR. MURPHY:

5 Q. Please state your name, business title, and company
6 for the record.

7 A. Dr. Christopher Andrew Ollson, spelled O-L-L-S-O-N.
8 I have a Ph.D. in environmental health. I am the owner
9 and senior environmental health scientist at Ollson
10 Environmental Health Management.

11 Q. What is your role with Crowned Ridge Wind?

12 A. My role first began in late 2016 when Crowned Ridge
13 Wind engaged me to aid in their Commission discussions
14 with both counties in planning and zoning during
15 ordinance.

16 My role has been to review the literature,
17 scientific literature, provided by some proper siting of
18 the project.

19 Q. Please provide a short overview of your education
20 and experience.

21 A. Certainly.

22 Commissioners, I hold a Bachelor's of Science in
23 biology from Queens University. I held a master's and a
24 Ph.D. in environmental health, environmental sciences
25 from the Royal Military College of Canada. Over the

1 course of the last 20 years I have been an environmental
2 health consultant as well as adjunct professor at the
3 University of Toronto.

4 Day to day when I come to work on the wind -- well,
5 it essentially started out about 10 years ago when I was
6 in practicing and things like air quality assessments,
7 risk assessments, and contaminated sites and the like. I
8 was approached about what are the health concerns or
9 effects of living around wind projects.

10 Since 2009 and up to today, I've conducted a number
11 of research studies, published over six peer-reviewed
12 publications in scientific literature. And appearing
13 before you is not uncommon for what I do. I've appeared
14 before the North Dakota Public Services Commission on a
15 number of projects. I appeared before a number of county
16 commissions when they're making their decisions on proper
17 siting of wind projects.

18 In addition to my role with working with developers,
19 I've also been the consultant of record for the Vermont
20 Public Services Department when they were setting their
21 sound rules, and I've also appeared before the North
22 Dakota and Indiana Senates during hearings that they were
23 holding with regards to wind turbines and noise and
24 siting.

25 Q. Did you file prefiled Supplemental Testimony on

1 April 9, 2019, that is marked as A24 and Exhibits A24-1
2 through A24-17?

3 A. I did.

4 Q. Do you have any corrections or changes to that
5 testimony or to the exhibits?

6 A. I do not.

7 Q. Did you prefile Rebuttal Testimony on May 23, 2019,
8 that is marked as A38 and accompanying Exhibits A38-1
9 through A38-7?

10 A. I did.

11 Q. Do you have any changes or corrections to that
12 testimony or those exhibits?

13 A. I do not.

14 Q. Please provide a short summary of your prefiled
15 testimony.

16 A. Commissioners, I believe the weight of scientific
17 evidence of over 100 peer-reviewed scientific papers
18 published in the last 15 years indicates that the project
19 as proposed by Crowned Ridge Wind meets the test for
20 proper siting.

21 There are three main areas of concern that need to
22 be addressed when dealing with proper siting of wind
23 turbines: The audible noise level or the level of
24 decibels, dBA, infrasound and low frequent sound, and
25 shadow flicker.

1 As Dr. McCunney indicated just prior to my
2 testimony, the most comprehensive study that's been
3 conducted around the world was that by Health Canada.
4 They're essentially the equivalent of the CDC here in the
5 United States.

6 From 2012 to 2014 they surveyed over 1,200 people
7 living as close as 820 feet from wind turbines and as far
8 as 7 miles away. They investigated both subjective and
9 objective measures of health, including annoyance and,
10 for the first time, looked at things like sleep,
11 cortisol, blood pressure, amongst others, and the audible
12 sound level this those studies was up to 46 decibels.

13 For audible sound if the wind turbines are sited too
14 close to people's homes, candidly, they can be too loud,
15 and you can experience health impacts. We used to site
16 turbines a lot closer in the United States and around the
17 world to people's homes than we do today.

18 If you look at old county ordinances or even state
19 statutes, used to be 1,000 feet and 55 decibels was a
20 very common sound standard. Not to say that anybody was
21 actually impacted by those. We do know that that is too
22 close, and, in fact, I won't work on projects where the
23 sound level is over 50 decibels at the exterior of
24 people's homes.

25 That said, I think that Crowned Ridge has sited the

1 project adhering to the most stringent Grant County
2 standard of 45 decibels at the exterior of homes or
3 nonparticipants and 50, participants. I've provided you
4 with many papers in my Supplemental Testimony that
5 support that these levels are protective of health.

6 With respect to low frequency noise and infrasound,
7 candidly, if I was before you seven or eight years ago,
8 Mr. Lampeter's paper would have been the only one where
9 we actually had measurements of low frequency noise and
10 infrasound.

11 Over the past five years or so my research, as well
12 as many others, have conducted research on low frequency
13 noise and infrasound specifically to turbines, and what
14 we've concluded is that if you set an appropriate audible
15 sound level, the dBA, the 45 dBA, you set far enough back
16 from turbines, that the level of infrasound, although you
17 can detect it, is certainly well below a threshold that
18 poses a health threat.

19 With respect to shadow flicker, as detailed in my
20 testimony, shadow flicker is not a health impact. The
21 turbines -- quite simply, epilepsy was initially a
22 condition that they were concerned about, epileptics
23 living around turbines. However, they quite simply don't
24 spin fast enough. And the flicker rate is well below the
25 threshold of a flicker rate that actually triggers

1 photosensitive epilepsy.

2 That said, shadow flicker can be a nuisance. So
3 similar to us talking about noise before, when we used to
4 set these turbines 1,000 feet from people's homes, you
5 will see shadow flicker videos, for example, in areas
6 where you've got quite a bit of shadow flicker in that
7 home. And that's because we had turbines to the east of
8 the house and to the west of the house a thousand feet
9 and, you know, could be well over 100 hours of shadow
10 flicker at that person's home.

11 So I believe the 30 hours of shadow flicker that's
12 been in both county ordinances proposed by Crowned Ridge
13 is consistent with other state statutes across the
14 Midwest as well as other counties, and it really has a
15 long history dating back to a German study and a German
16 ordinance that they put in place. So I believe limiting
17 shadow flicker to 30 hours is reasonable and will help
18 protect the welfare and quality of life.

19 So turning now briefly to welfare and quality of
20 life, as Dr. McCunney indicated -- similar to what
21 Dr. McCunney indicated, that we are looking to protect
22 against quality of life and, you know, protection of
23 annoyance and the like.

24 So we know that the question is does that annoyance
25 level lead to an impairment of quality of life or

1 welfare? There has been a number of studies, and, again,
2 including the most comprehensive would be the Health
3 Canada Study where they've got nine or 10 research papers
4 published. One of them specifically focuses on quality
5 of life and that what we see is for those living close to
6 the turbines, up to 46 decibels and 820 feet or if you
7 live 7 miles away, there's no difference in these blinded
8 surveys that they were provided in the various factors of
9 quality of life. And this is similar to other reports
10 that have been done around the world.

11 What is driving that annoyance? As Dr. McCunney
12 indicated, it's usually about 10 percent of the annoyance
13 can be attributed to the sound itself and not to any one
14 specific sound level. It's more in the literature. What
15 I have published, Health Canada, other researchers is
16 that it's driven by visual cue and attitude.

17 That's not to downplay those things. It's, you
18 know, like any noise source or any change in someone's
19 environment, there will be those who are not happy about
20 that change in the environment. That's what tends to
21 drive the annoyance.

22 And then, finally, turning to complaints. So does
23 annoyance then result in increased complaints? You've
24 heard from Mr. Hessler I know both in this hearing as
25 well as past hearings that he's found about a 2 percent

1 complaint rate with those living in the 40 to 45 decibel
2 range.

3 If we look at the Health Canada Study that did over
4 again 1,200 people, those living as far as 7 miles away,
5 those living as close as 820 feet, you actually get the
6 same result as Mr. Hessler did, about 2.6 percent
7 annoyance in that 40 to 45 range.

8 But that actually jumps up to approximately 4 or
9 5 percent in the 35 to 40 percent range. And we still
10 see 2 percent complain even for those living 7 miles away
11 at less than 25 decibels where they won't possibly hear
12 the turbines. So this again comes back to the notion
13 that it's more driven by visual cue and attitude.

14 So, finally, Crowned Ridge Wind meeting and
15 exceeding the requirements of the county ordinance meet
16 the test for a properly sited wind project. I do not
17 believe there would be any added benefit to health,
18 general welfare, quality of life to reduce the sound
19 levels below 45 decibels for nonparticipants.

20 However, that being said, the Commission has
21 heard -- I guess we're referring to them as the Hessler
22 seven. That they are in agreement with Mr. Hessler, and
23 when we can reduce sound levels, that's great. And they
24 have removed seven turbines to switch them to alternates.

25 What this has resulted in for the five Intervenors

1 is the closest turbine will be just under the mile. It's
2 about .96 or something of a mile from their home, and two
3 of the Intervenor's homes are actually over two and a
4 half miles away. This results in sound levels of 29 to
5 39 decibels and a range of zero to no more than seven
6 hours of shadow flicker at any one of the Intervenor
7 homes.

8 Thank you.

9 MR. MURPHY: Thank you. I offer this witness
10 for cross-examination.

11 MS. CREMER: Thank you.

12 Intervenor's.

13 MR. GANJE: Thank you.

14 CROSS-EXAMINATION

15 BY MR. GANJE:

16 Q. Dr. Ollson, good afternoon.

17 A. Good afternoon.

18 Q. Is this your first time testifying in South Dakota?

19 A. First time in South Dakota, yes.

20 Q. I'm going to refer you hopefully to documents that
21 the Applicant's counsel has provided to you. I'll start
22 with Intervenor I9-B.

23 A. Sorry. Is 9-B the witness statement?

24 Q. That's correct. There's two compatible documents.

25 A. Right.

1 Q. The witness statement is the longer of the two.

2 A. I have that in front of me, yes.

3 Q. Indeed, you have both?

4 A. I do have both, yes.

5 Q. Okay. And was this a witness statement that you
6 provided in 2014 in the Cedar Point wind farm proceedings
7 in Canada?

8 A. It was.

9 Q. Indeed.

10 You made some conclusions in the witness
11 statement -- the written witness statement. Were those
12 conclusions made in your written witness statement based
13 on the available evidence and taken also from articles
14 that you had coauthored I believe with one other author
15 at this time?

16 A. Yes. At this time the conclusions reached within
17 this article would have included all of the literature up
18 into --

19 Q. 2014?

20 A. -- I believe about mid-2014. So about June of 2014,
21 although it's dated October, is when the witness
22 statement -- at that point I believe it includes reliance
23 on at least three of the peer-reviewed publications that
24 I have as well.

25 Q. I thought so. Thank you.

1 Was your conclusion in that testimony that setbacks
2 should be based -- should be sound-based rather than
3 distance-based?

4 A. Yes. That's correct. And still maintain that
5 today.

6 Q. Yes, sir. Did you also conclude in that testimony
7 that postconstruction monitoring should be commonplace to
8 ensure modeled sound levels are within required noise
9 limits?

10 A. Yes. And that's still my position today.

11 Q. Indeed.

12 Did you suggest in that testimony that community
13 consultation and community support when sound emissions
14 are in the 40 to 45 dBA range for nonparticipators should
15 be undertaken?

16 A. Yeah. I mean, perhaps it would be useful to the
17 Commission that it can read the actual bullet verbatim.
18 It is on page 6 of 8 of that witness statement. And it
19 is under paragraph 17, and I believe it is subparagraph
20 D.

21 "If sound emissions from wind projects are in the 40
22 to 45 dBA range at nonparticipating receptors, we suggest
23 community consultation and community support." And I
24 stand by that today, and I believe that's what Crowned
25 Ridge Wind has achieved.

1 Q. Okay. Did you participate in community consultation
2 in this proceeding?

3 A. I did. In fact, I was at a number of consultations.
4 There was a public open house meeting that was -- I don't
5 have the exact date, but it was held in Watertown on at
6 least one occasion where the public was invited to come
7 and speak on the project.

8 My involvement in this project actually began back
9 in late 2016. At that point it wasn't Crowned Ridge I
10 and II. It was Crowned Ridge. And so starting in Deuel
11 County. And then I spent a significant amount of time in
12 Deuel County, Codington County, and Grant County,
13 appearing in front of the county commissions and the
14 county planning and zoning.

15 Q. I believe in that testimony you said that the limit
16 of 40 dBA or less for nonparticipators was the same
17 guideline as WHO, that is the World Health Organization,
18 had recommended in a 2009 study, isn't it?

19 A. Yes. In fact, there's a bit of nuance to that, but,
20 yes, it is consistent.

21 Q. And you cited that, I believe, in the testimony, in
22 the Canadian testimony?

23 A. I did.

24 Q. You did.

25 And in that -- I'm going to -- prior to that

1 Canadian testimony that you were talking about here in
2 the Cedar Point proceeding, you stated that in another
3 matter 40 dBA and a minimum separation of 550 meters were
4 reasonable and sufficient to protect against human health
5 effects.

6 And that's found, isn't it, in the Cedar Point
7 testimony?

8 A. Yes. To clarify, the reason why it says less than
9 40 decibels and 550 meters is that is the statute and the
10 limitation in Ontario. So it's being asked to opine
11 specifically on whether or not 550 meters, which is give
12 or take just over 1,600 feet, and 40 decibels would be a
13 sufficient setback.

14 And it wasn't stated that anything above that would
15 be incorrect. It was just whether or not that was a
16 reasonable standard in Ontario.

17 Q. Well, you said generally that it was reasonable and
18 sufficient to protect against human effects, didn't you?

19 A. Indeed, I did.

20 Q. Okay.

21 A. Again, commenting specifically on their limit at the
22 time.

23 Q. In your 2014 Cedar Point testimony, did you identify
24 certain best practices for wind turbine development?

25 A. Yes. In fact, again, that comes from that page 6 of

1 8, bullet 17, and that is from a 2014 paper. Those are
2 immediately -- I'm sorry. They are reproduced out of a
3 paper that I and my colleagues had written in 2014.

4 Q. Okay. So you had published not only -- but in this
5 testimony we're talking about here, this Canadian
6 testimony, but you also published an article in which
7 you've identified certain best practices for wind turbine
8 development; is that correct?

9 A. Yes. That I believe to be correct at the time in
10 2014.

11 Q. Okay. In your written testimony or statement did
12 you state that "these best practices include a preference
13 for sound emissions of 40 dBA or less for
14 nonparticipating receptors"?

15 A. I did. And that was in the absence of any community
16 consultation or community support. So what that bullet
17 says is that if you're going to go build a project --
18 there are jurisdictions, for example, where there are
19 unzoned counties or there's states that don't have
20 requirements, that if you were going to go into a state
21 like that -- Texas is a good example -- without any
22 consultation, that it might be a good idea at that point
23 if you wanted to limit your project to 40 decibels.

24 If you wanted to go beyond 40, in this case 40 to
25 45, then it suggests in that best practices that one

1 should conduct consultation and have community support.
2 And I believe the consultation certainly has been done,
3 including with the tribes.

4 In addition to that, the community support piece of
5 that, I would suggest, is the fact that you have two
6 county commissions that have gone through significant
7 changes to their ordinances, in addition to that that
8 both counties have approved the project with their
9 updated ordinances, and further to that, that we have,
10 you know, a hearing here before you today.

11 So you're looking at does the community have
12 support? I would suggest to you that if you look at the
13 Intervenors in this case, that for those that live within
14 a mile and a half of the project, there are only two, and
15 within that, you know, that represents about 2 percent of
16 the community. So I believe that this does that
17 condition that I said, with community consultation and
18 support is met.

19 Q. In your best practices recommendation given in that
20 proceeding, did you state that setbacks permitting levels
21 of greater than 45 dBA wind turbine noise only, not
22 including ambient noise, for nonparticipating receptors
23 is not supported because of possible direct effects from
24 audibility and from levels of annoyance above
25 background?

1 A. I did. Again, and that was specifically for
2 nonparticipants.

3 Q. Uh-huh. I would refer you, sir, to another exhibit.

4 A. Yes.

5 Q. Sorry about that. I will refer you to I10. I don't
6 think I mentioned it to you.

7 A. That's the slide presentation.

8 Q. That's correct.

9 A. Yes. I have it in front of me.

10 Q. Okay. And is this a slide presentation that you did
11 in 2014 with the firm identified as Intrinsic?

12 A. Yes. At the time that I gave this presentation I
13 was working as a vice president and senior environmental
14 health scientist at a small health scientist firm called
15 Intrinsic, which is out of Toronto, Canada.

16 Q. You were the co-presenter at that presentation?

17 A. I don't have the exact date on this presentation,
18 but, I mean, certainly I gave this presentation and some
19 form of it. I couldn't tell you exactly which conference
20 it was at. But certainly it would have been around 2014
21 that I gave this talk, yes.

22 Q. Thank you.

23 In the presentation did you state that the
24 environmental noise above certain levels is a recognized
25 factor in human health issues?

1 A. Certainly I did, or we wouldn't have limits. And
2 that's why I said today that above 50 decibels I wouldn't
3 support that for a wind project.

4 Q. Do recognized human health issues that you discussed
5 in the seminar include the issue of hearing, sleep
6 disturbance, and myocardial infarction as well as
7 annoyance?

8 A. Certainly these are a -- it says, "Environmental
9 noise above certain levels is a recognized factor in a
10 number of human health issues," and, yes, the list that
11 you had read. And certainly it can be.

12 Q. In the presentation did you state that "Noise from
13 wind turbines can be annoying to some and associated with
14 sleep disturbances especially at levels greater than
15 40 dBA"?

16 A. Yes. And, again, if we were to go back and then
17 above 40 so now it's looking at what is that number above
18 40, and when we look at the -- and, as in my Supplemental
19 Testimony, the most comprehensive study about what
20 constitutes sleep disturbance specifically for wind
21 turbines is Dr. Michaud.

22 You'll hear me refer to him as the Michaud papers.
23 He's the senior author from Health Canada. And in the
24 2016 article about sleep I've included in the
25 Supplemental Testimony, Dr. Michaud vetted out

1 approximately half of the research people around those
2 turbines.

3 So over 700 people were wearing what's called an
4 active meter. It looks like a Fitbit. It's a fancy
5 Fitbit. And they put them on for sleep. And they're
6 able to monitor sleep data through that. And what you
7 see from the Mishaud and Health Canada work is even up to
8 46 decibels whether you live close by the turbines 46
9 decibels or you live 7 miles away and you can't possibly
10 ever hear them, that the sleep was no different for those
11 living close or nearby. So that's why I believe 45
12 decibels, up to that, at least, for nonparticipants is a
13 reasonable number to ensure protection for sleep.

14 Q. In that presentation didn't you report that a
15 40 dBA limit was based on the World Health Organization
16 noise guideline?

17 A. Yes. And, again, you have to be -- I mean, yes.
18 And there's a lot of nuances to that World Health
19 Organization noise guideline.

20 The first is that the night noise guideline for
21 Europe was a 2009 document.

22 Q. But the only reference in that --

23 MR. MURPHY: Objection.

24 CHAIRMAN HANSON: Hold on.

25 MR. MURPHY: Objection. Objection. Three

1 times. I would like the witness to be able to finish his
2 statement.

3 MS. CREMER: I am going to sustain his
4 objection. You did ask him kind of an open-ended
5 question, and I would allow him to answer.

6 A. So, Commissioners, the 2009 night noise guidance
7 from Europe is an excellent document. Doesn't have
8 anything to do with wind turbines, but at that point it
9 wasn't a concern yet.

10 But the 40 decibels that's listed there as the
11 target level for nighttime noise to protect sleep is on a
12 metric called L night. So it is the average sound level
13 at the exterior of somebody's home over the course of all
14 365 days, and then you average that out.

15 What you're looking at and what your rules say and
16 what the county commissions have adopted, this 45
17 decibels is not an L night. It is a one-hour or a
18 10-minute that you can't exceed 45 decibels during the
19 monitoring.

20 So if Mr. Lampeter was to go out and measure -- and
21 the way I understand the postconstruction monitoring
22 that's done here, it's not an average over the course of
23 a year.

24 There are jurisdictions, such as New York and some
25 others, where actually they look at an average over the

1 year. What we see for all the modeling that's done for
2 how you get an annual average versus the modeling you've
3 seen from Mr. Haley and discussed by Mr. Lampeter,
4 there's about a 5 decibel difference there.

5 So the World Health Organization L night 40 is the
6 equivalent of what this Commission has seen in the past,
7 what the counties have as a 45 decibel Leq. So you can
8 imagine there's lots of nights the wind turbines aren't
9 spinning. There are times where they're not spinning as
10 loud because you're not producing low power.

11 So when you average out over the course of the year
12 nighttime exposure, the 45 decibel Leq that you're
13 looking at is the equivalent of the WHO 40 L night
14 average over the year.

15 Q. But in your testimony -- strike that.

16 In this presentation that you did as a co-leader you
17 referenced the 40 dBA, and you didn't put any of these
18 conditions on it that you're now discussing, did you?

19 A. What I was referencing in the 20-minute presentation
20 given at a conference, no, I did not go into the overly
21 great specifics that I'm doing here with the Commission
22 because it's an overview presentation to a scientific
23 audience.

24 So certainly it's a well held view. It is
25 scientifically factually correct. And it's in many of

1 the writings that I've done since this presentation prior
2 to this presentation.

3 Q. Okay. You're talking about the 40 dBA recommended
4 level.

5 A. Yes. I mean, and I believe that you provided me
6 with the WHO document. I'm happy to take you to the
7 footnote in the table that explains exactly what the
8 L night metric is.

9 Q. No. My question was whether we were all referring
10 to the 40 dBA label on it. And I think you answered that
11 so thank you.

12 My next question is did your presentation in this
13 2014 seminar also state that health effects occur
14 regardless of regulated setbacks?

15 A. No. I don't believe I said that. Could you take me
16 to the slide?

17 Q. Well, we can. I think we can.

18 I don't think your slide is numbered, but it would
19 be page 7.

20 A. Sorry. What's the title on the top of the slide, if
21 you would.

22 Q. Yes. I'll get it. The slides weren't numbered.

23 A. No, they weren't.

24 Q. Okay. Your title on that particular slide in your
25 presentation was Human Health - The Debate.

1 A. Yes.

2 Q. And in that doesn't this program state that human
3 health effects related to wind turbine operation -- and
4 then it goes down to an asterisk or footnote that says,
5 "often regardless of regulated setbacks," and then you
6 list some of the issues.

7 A. So, again, maybe to put this into context, this is a
8 slide where I put the slide up. Says, Human Health - The
9 Debate.

10 And I go on to say, these are the issues -- just
11 like I said here today to the Commissioners, these are
12 the issues that are often in debate: The audible noise,
13 low frequency, shadow flicker, visual cue, attitude, and
14 the like. The asterisk saying often regardless of
15 regulated setbacks.

16 It doesn't mean these effects occur. Just like I
17 was describing with the complaints, whether you're close
18 by or farther away, you may have subjective views that,
19 you know, I don't like the noise, I don't like the wind
20 turbines. And when I say regardless of regulated
21 setbacks is that whether you have somebody who's very
22 close in or the person's very far away, I have no way of
23 telling which one's going to complain because there's no
24 difference.

25 Q. Okay. Then I'm going to ask you to look at what I

1 think would be page 20 of your program. And it's called
2 Intrinsic Health-Based Siting Recommendations. It's on
3 page 20 but, again, the presentation isn't numbered. But
4 that's the caption at the top of that page.

5 A. Yes. These are the same recommendations that I say
6 came from the 2014 paper that are similar or the same
7 recommendations that we just went through in the
8 testimony that I gave at the senior point project.

9 Q. In this presentation did you state that -- did you
10 recommend that preference should be given to sound
11 emissions of 40 dBA or less outside, not including
12 ambient, for a nonparticipating individuals?

13 A. Yes. And, again, as I have previously described,
14 that is without consultation. So if there's no
15 consultation or regulatory requirements, that you should
16 start thinking about 40. And that is the fourth bullet
17 down from there is the same bullet I've read a number of
18 times that says between 40 and 45 dBA that that is more
19 than sufficient once you have community support and
20 consultation.

21 Q. But you called the 40 dBA recommendation a
22 preference; correct?

23 A. Again, in the absence of any consultation or
24 community support. So if you're in a jurisdiction where
25 there's no requirement, there's no statutory limits,

1 there's no need to consult with the community --

2 That first bullet is essentially now no longer
3 really relevant because the vast majority of
4 jurisdictions that you're in, that consultation is going
5 to occur. You are going to be working with the
6 communities. And most counties now if they do not have
7 zoning ordinances if a wind developer comes into the
8 community, it's my experience that they will develop
9 ordinances and so consultation will need to be done.

10 Q. Okay. So you've testified that yes, indeed, you did
11 use the word "preference" for 40 dBA in this
12 presentation. You've testified that you've also
13 indicated that in apparently some writings that it be
14 your preference.

15 Have you retracted that and changed that number in
16 any subsequent writings?

17 A. No. Counselor, again, you're missing the point of
18 it says -- there's no words around consultation or
19 anything else. That fourth bullet is what we're
20 discussing today, that it's entirely appropriate for a
21 40 to 45 decibel limit for a project if you have
22 community engagement and community support.

23 So I'm not retracting number 2. And still, if you
24 were to find a jurisdiction that's going to let you just
25 come in and build a wind farm, you probably should start

1 at that 40 decibels because you may have pushback later.
2 But when you do two to three years of consultation and
3 garner community support it's certainly acceptable to be
4 up to 45 decibels.

5 In addition to that, this was all done and written
6 before the Health Canada Study, the two and a half
7 million dollar study --

8 (Discussion off the record.)

9 A. This was all done prior to the Health Canada Study
10 being published and the numerous other articles since
11 then that I believe firmly support a 45 decibel limit for
12 a nonparticipating receptor is acceptable.

13 Q. But have you changed, in any of your writings, your
14 opinion from the statement that preference should be
15 given to sound emissions of 40 or less dBA?

16 A. I have not. And, again, if you were in a community
17 that you're going to do no consultation and you're not
18 going to try to get community support, then I would still
19 advise that 40 might be the right number to go to. But
20 that's not the case here.

21 Q. You were good enough to provide some of your
22 writings. I believe that you attached them to your
23 resume in this proceeding; correct?

24 A. Certainly the peer-reviewed publications are all on
25 my resume. I'm not certain if all of them are attached.

1 Q. Okay. I'm going to ask you to look at Applicant's
2 Exhibit A24-2.

3 A. Okay. One second, please.

4 Q. Sure.

5 A. I believe that's the one entitled Health Effects In
6 Wind Turbines, a review of the literature coauthored by
7 Dr. Knopper and myself co-authored in 2011, yes.

8 Q. And in that 2011 article, which is A24-2, on page 2
9 did you refer to the 40 dBA noise guideline as a "health
10 based value limit"?

11 A. If you could take me --

12 Q. Sure. I apologize. Can I help you get there?

13 A. That would be great.

14 Q. Okay. Let's go with the left-hand column.

15 A. Yes.

16 Q. And the last full paragraph.

17 A. The one that starts "as a result"?

18 Q. That's right. And then towards the bottom you
19 discuss the 40 dBA recommendation. Just to help make you
20 move forward to what I want to ask is --

21 A. Sure.

22 Q. -- you quoted the World Health Organization
23 recommendation, but then in your own words in the article
24 you referred to it as a health-based limit value; is that
25 correct?

1 A. Certainly. Yes. Again, it refers specifically
2 commenting on the Ontario limit of 40 decibels, and it
3 comments that, yes, at 40 decibels that is a health-based
4 limit. It doesn't restrict it to other limits. It's
5 simply commenting specifically on that limit.

6 Q. Okay. Thank you.

7 I refer you now, please, to page 4 of your article.
8 We will look at page 4 of that exhibit, and we'll start
9 with the first full paragraph.

10 A. Starting with "in 2011"?

11 Q. That's right.

12 In that paragraph I believe you're discussing prior
13 studies that had been done on issues of sleep
14 interruption and sleep disturbance; is that correct?

15 A. Yes. This is the early work by Eja Pedersen,
16 Dr. Pedersen, out of Sweden and some of the work that she
17 had done prior to 2011.

18 Q. Does her study conclude that sleep disturbance
19 spikes at 40 and 45 dBA? It's the last couple --

20 A. Yes.

21 Q. Okay.

22 A. What Dr. Pedersen found in her early work -- and
23 this was, again, all on the subjective questions that she
24 had been asking people, blinded. It was excellent
25 research that had been conducted in Europe at the time.

1 They actually had sound levels -- and well over 50,
2 up to 54 decibels at these projects. And what we noticed
3 actually in her work not only in 40 decibels, 45, she
4 started seeing self-reported discussions around sleep
5 with some of the individuals. Yes.

6 Q. Anywhere in that article, sir, do you disagree in
7 your conclusions?

8 A. No. No. In this 2011 article, in fact, we
9 cautioned that, you know, more work needed to be done.
10 Because this is -- we're talking about eight years ago.
11 And Eja Pedersen had done some excellent preliminary
12 research. She hadn't done objective measures of sleep.

13 There's now -- since that time in addition to the
14 Health Canada Study, Commissioners, there's a number of
15 other sleep studies that have been done, actual sleep
16 studies. Jalai was another one that I put in for you in
17 your binder.

18 And, again, what we see is when we actually further
19 the research and we're now at a point where we've done
20 those studies of getting people sleep meters and we're
21 actually studying people's actual sleep around wind
22 turbines, that what we're seeing is that this isn't
23 actually the case.

24 And when I say "spike" there it wasn't saying that
25 it was above a level that would have been a concern. It

1 was something that we needed to investigate further.

2 Q. Okay. I refer you, please, to page 9 of your
3 article.

4 A. I'm there.

5 Q. Okay. Thank you. To get it a little more focused,
6 the first full paragraph of the right-hand column.

7 A. Starting with "assessing"?

8 Q. This was a part of the conclusion portion of the
9 article; is that correct?

10 A. That's correct.

11 Q. Okay. In your conclusions do you conclude that
12 research into the effects of wind turbines could involve
13 a baseline health study, a baseline noise and infrasound
14 monitoring, and noise modeling, and then postconstruction
15 follow-up to these things?

16 A. Yes. And, in fact, I take great pride in the fact
17 that this paper was published in 2011 and since that time
18 those studies have actually been completed and we have a
19 lot more detailed information on that, including studies
20 that we did on infrasound both in a post and
21 preconstruction manner.

22 Q. In this proceeding did you recommend that there be a
23 baseline health survey and a baseline infrasound and
24 noise study?

25 A. So, again, that's not referring to every individual

1 project. What that's referring to is that in the field
2 and in the science of where we were in 2011 that ideally
3 we would have had some of these baseline studies that
4 aren't very common at the time in 2011 and that that
5 would help -- on a couple of projects that would then
6 help inform us for Commission decisions like this
7 Commission faces today.

8 So it does not say for every individual project. I
9 mean, it would be not feasible to do a baseline health
10 study. Like if you look at the Health Canada Study, if
11 you look at studies done in Japan, if you look at the
12 Australian studies, if you look at some of the studies
13 done here in the U.S., since 2011 --

14 In 2011 this research article refers to 15 other
15 articles that were available at the time. Since that
16 time and, as I indicated to the Commission, today there
17 are over 100 such studies. So that research gap, I
18 believe, has been filled.

19 Q. But my question really has to do with your
20 recommendations and comments on this proceeding. On this
21 project we're here on today.

22 In this proceeding did you recommend a baseline
23 noise study?

24 A. Sorry. For Crowned Ridge I?

25 Q. Yes. This one.

1 A. No, I did not. Because I don't believe it's
2 warranted.

3 Q. Sir, I would kindly now refer you to Applicant's
4 Exhibit A24-10.

5 A. The paper that I authored entitled Wind Turbines and
6 Health?

7 Q. Yes.

8 A. June 2014?

9 Q. Exactly. So this was several years later; correct?

10 A. Yes. This is the article that we were discussing
11 that those conclusions that came out of the five bullets
12 that we've been reading through is this paper, yes.

13 Q. I refer you, please, to page 17 of the article and
14 the last paragraph in the left-hand column.

15 A. Sorry. The one that starts "stress/annoyance"?

16 Q. Let's see. Page 17.

17 A. I'm on page 17. Sorry. Which paragraph?

18 Q. Yes. Okay. Well, we'll start at the very bottom
19 paragraph on the left-hand column.

20 A. "Based on the available"?

21 Q. Right. Right. I believe that statement indicates
22 that you're making some best practices recommendation for
23 wind turbine developments; is that correct?

24 A. Yes. In 2014. And then it goes on and listed the
25 same ones we've been discussing.

1 Q. Okay. Okay. The right-hand column lists your
2 recommendations; is that correct?

3 A. It does. And they are the same six that we have
4 been discussing.

5 Q. Uh-huh. And did you again state in this 2014
6 article that your preference should be given to sound
7 emissions of 40 dBA or less for nonparticipating
8 receptors?

9 A. Yes. Again, this is the same bullet and the same
10 context with all the other bullets, but it also in bullet
11 then 4 goes on to describe when it would be appropriate
12 to have a 40 to 45 decibel range.

13 Q. The only recommendation I see which has the word
14 preference is the one where you recommend 40 dBA or less
15 for nonparticipating receptors; is that correct?

16 A. Again, where it says, "In the absence of guidelines
17 and/or community consultation and the like." And you
18 have to read all six of these bullets together to put it
19 into context.

20 So there is a preference. In bullet 4 if the sound
21 emissions from wind projects is in the 40 to 45 dBA range
22 for nonparticipating receptors, we suggest community
23 consultation and community support.

24 That is my preference. When there is a project that
25 is going to be in the 40 to 45 range my preference is

1 then it's certainly allowable. It was backed up by all
2 of the research since that time from a health and
3 annoyance and complaint standpoint. And that's where it
4 says in that fourth bullet that you need community
5 consultation and support.

6 Q. But the only place I see where you use the word
7 "preference" is where you're discussing 40 dBA or less
8 for nonparticipating. I'm asking if it's elsewhere on
9 this list of recommendations.

10 MR. MURPHY: Objection. This line of
11 questioning, we've been over it five or six times. I
12 think the witness has been clear on his position. I
13 would ask that the Hearing Examiner direct the attorney
14 to go to a new line of questioning.

15 MS. CREMER: So is your objection asked and
16 answered?

17 MR. MURPHY: I'm sorry. Yes.

18 MS. CREMER: Thank you.

19 Do you have a response?

20 MR. GANJE: No, I don't.

21 MS. CREMER: I would sustain.

22 Q. In your best practices recommendation No. 4 -- no.
23 I'll strike that.

24 In your best practices recommendation No. 5 did you
25 recommend that setbacks that would permit sound levels of

1 greater than 45 dBA wind turbine noise only, not
2 including ambient noise, for nonparticipating receptors
3 was not supported due to a possible direct effect from
4 audibility and possible levels of annoyance above
5 background?

6 A. Yes. That's what it says.

7 MR. GANJE: No further questions.

8 MS. CREMER: So we've gone a long time here. Do
9 you have a lot of questions?

10 MR. MIKAL HANSON: No.

11 MS. CREMER: And, Commissioners, do you have any
12 questions?

13 COMMISSIONER FIEGEN: I do not. I have no
14 questions.

15 MS. CREMER: Oh. Do you anticipate much
16 redirect?

17 (Discussion off the record.)

18 MS. CREMER: Staff.

19 MR. MIKAL HANSON: Thank you.

20 CROSS-EXAMINATION

21 BY MR. MIKAL HANSON:

22 Q. I saw on I believe it's your Direct Testimony that
23 there's no shadow flicker in open space. Do you recall
24 saying something along those lines?

25 A. Yeah. Yes.

1 Q. Now just my common sense tells me I'm standing in an
2 open space under a wind turbine, and the blade is going
3 between me and the sun, isn't there going to be a
4 flicker?

5 I mean, isn't there going to be an interruption of
6 the sun onto me?

7 A. Right. So that's different, counselor, than shadow
8 flicker. So I'm not saying that you don't have shadows
9 cast or there isn't an interruption between the blade and
10 the sun.

11 When we specifically refer to shadow flicker it is
12 that flickering effect inside the house. So that is the
13 term that we use within the industry so you actually get
14 a flickering effect in the house.

15 If you're outside, you don't actually -- the shadow
16 from the turbine itself doesn't create a flicker. It's
17 just a moving shadow you'd see if you were at a farm
18 standing in a field. Certainly if you're looking at the
19 turbine, you will get that interruption of the sun if the
20 sun is directly behind it for sure.

21 Q. And to me that's a flicker. But a term of art --

22 A. Absolutely.

23 Q. -- in the business it has to be through a window,
24 and it has to be through some type of opening in a
25 structure?

1 A. That's right. Because that's where the annoyance,
2 if you will, of having that in your house actually can be
3 magnified as posed to it just being outside. We don't
4 usually have people commenting when it's outside just
5 because you've got everything else around you.

6 MR. MIKAL HANSON: That's my question. Thank
7 you.

8 MS. CREMER: Okay. That would take us to
9 Commission questions. And, Commissioner Fiegen, you said
10 you had none.

11 So then Chairman Hanson.

12 CHAIRMAN HANSON: Thank you.

13 Good afternoon.

14 THE WITNESS: Good afternoon, Chairman.

15 CHAIRMAN HANSON: I actually had a lot of
16 questions of you, and I -- I hate to broach anything
17 about 40 because you've answered so many.

18 What were you an adjunct professor in?

19 THE WITNESS: So I hold an adjunct professorship
20 in environmental health in the environmental sciences
21 department at the University of Toronto. I supervise
22 doctoral students, and I also teach a graduate level
23 course every year in environmental health.

24 CHAIRMAN HANSON: You also have a Ph.D. in
25 philosophy?

1 THE WITNESS: Sir, that is the -- that is the --
2 the doctorate of philosophy is the designation for
3 sciences Ph.D.s as well.

4 CHAIRMAN HANSON: Okay. On your testimony you
5 state that the critical effect from a health
6 perspective -- from a health perspective in setting any
7 nighttime sound source standard is to ensure that it is
8 protective of sleep. So sleep is extremely important.

9 You also state in a book, and you state the
10 book, it was reported that it is estimated that 50 to 70
11 million Americans suffer from chronic disorder of sleep
12 and wakefulness hindering daily functioning and adversely
13 affecting health.

14 So it's obviously a challenge in -- you say
15 Americans. I'm assuming it's the United States that
16 you're referring to. Obviously not all those people are
17 affected by wind turbines by any means.

18 But then you mention sleep. You go on and on
19 and discuss sleep disturbance as being extremely
20 important. And then on page 7 you refer to -- well, your
21 last sentence in a quote that you put down that "no
22 statistically significant affect on any measure of sleep
23 quality" is a conclusion from the WTN levels up to
24 46 dBA.

25 Again, the clarification of statistically

1 significant. So WTN levels up to 46 dBA do have an
2 effect, and we've gone over that, at least others have,
3 with you. But are we to ignore those persons who are not
4 statistically significant?

5 THE WITNESS: No, Commissioner. It might be
6 helpful -- under my testimony A24 and I believe it's
7 Tab 3, that is the Health Canada Study. That is the
8 Michaud Study. It's one of three or four that I've
9 provided to you.

10 CHAIRMAN HANSON: Forgive me for interrupting.
11 Yes, I did read that.

12 THE WITNESS: So perfect.

13 If we were to turn I believe it's around five or
14 six pages in but it's numbered at pages 102 in that
15 document, and it's Table 1.

16 And what I mean by no statistically significant
17 difference is that, again, if you have 1,200 people -- or
18 1,238 I believe was the number of people and of that
19 subset, 734 give or take were actually fitted with these
20 sleep meters. So they actually asked them their
21 perceptions on sleep and also studied their actual sleep
22 patterns.

23 And you'll see that you've got the self-reported
24 here at the top of that table where it says
25 "Self-Reported Sleep Disturbance." And if you kind of

1 went across the top, those are the noise levels in the
2 various columns from, you know, less than 25 decibels
3 right up to the 40 to 46 decibels.

4 And when you kind of go across that row -- and,
5 you know, maybe probably the best one, "self-reported
6 sleep disturbance" so those are the people that said,
7 yeah, I'm disturbed at night in my sleep, if you went to
8 the Highly, about three lines down, the Highly, the
9 numbers that are outside of the brackets are the total
10 number of people, and then the numbers in the brackets
11 are the percentage.

12 And if you looked at the Less Than 25, so the
13 people living very far away, you had 15.7 percent
14 reporting sleep disturbance. And if you come to the --
15 right across to the right from the 40 to the 46, you've
16 go only 10.3 percent reporting disturbance.

17 So, again, it's not that people don't report
18 disturbance, but it's no different than -- in fact, in
19 this case it's lower, but it's not statistically
20 significant. So sleep issues are a common issue for a
21 whole host of reasons.

22 And the reason I say it's very important -- and
23 down to the individual level to make sure we are -- from
24 the noise itself, right, that we're not causing sleep
25 disturbances. This also captures the annoyance, all the

1 other issues that came into people's subjective feelings,
2 is that we want to make sure that we are setting a noise
3 level that we are preventing or ensuring a good night's
4 sleep for everybody.

5 Because you can imagine 20 to 30 years of
6 hosting turbines where that's not going to occur would be
7 very problematic. So it's why we have -- you know, we
8 set these noise levels.

9 Can I say for certainty that not one single
10 individual may have been affected? I can't say that.
11 But we have -- it's like any source of noise, whether
12 it's airport noise, whether it's roadway noise, or any
13 environmental issue, we can't say for 100 percent
14 certainty nobody, but what we're saying is as a
15 population we do not expect that people will experience
16 that issue.

17 And I recognize as Commissioners it's a
18 challenge; right? I can't sit here and, as Dr. McCunney
19 couldn't either, say absolutely not one individual would
20 ever be woken up from a turbine.

21 But then if I was to take you to a couple of
22 tabs over and it was the Bakker paper from 2012 and
23 you'll see the Pedersen name as well -- this is Eja
24 Pedersen's research group -- it was one of the tables
25 that I put into the Direct Testimony. And it's a couple

1 of pages in on page 47, Table 7. This is the one by, you
2 know, how are people disturbed who are living around
3 turbines in their sleep? And these are the rural people
4 in the Netherlands so, you know, similar to South
5 Dakotans. These are people who live on farms or small
6 acreages in rural Netherlands.

7 You had -- out of the people who reported being
8 woken up in their sleep, not just to get up to go to the
9 wash room. In fact, they excluded is that. So you had
10 11.7 percent of people said that they were woken up by
11 people or animal sounds, 12 and a half or 12.5 percent of
12 people by traffic and mechanical sounds, and 6 percent by
13 wind turbine sounds.

14 So, again, we're well within a background or
15 less than other sources of rural sound that are waking
16 people up. So that's why -- and this study's up to
17 54 decibels. So these are, you know, turbines that were
18 a lot louder at the time.

19 So we are trying to find that reasonable
20 balance, I mean, in making sure that we are protecting
21 people to get a good night's sleep because of all the
22 cascading effects that can happen after that if they
23 don't.

24 CHAIRMAN HANSON: You led us on a very long
25 journey around the world.

1 THE WITNESS: I was actually supposed to be in
2 Lisbon with Mr. Hessler this week, but instead I chose to
3 come hang out with you folks.

4 CHAIRMAN HANSON: And I suspect I should be
5 concerned about the animals in the Netherlands waking up
6 the farmers, but my question was should we not be
7 concerned with the people who are statistically
8 unimportant?

9 THE WITNESS: No, Commissioner. That's not what
10 it means by statistically significant.

11 We mean that by all of those people who are
12 living near the turbines compared to all those people
13 that were living far away from the turbines, there's no
14 difference in any of them. So we are accounting for all
15 of the individuals.

16 So we're not saying that there's a few that drop
17 off outside of that.

18 CHAIRMAN HANSON: You're saying that the number
19 of people who are affected are not statistically
20 important.

21 THE WITNESS: No, Commissioner. What I'm saying
22 is that people aren't affected. What I'm saying is that
23 the research we've been going through says if you had
24 people living right close to the turbines and you have
25 the people living further away, there's actually more

1 people living further away that are actually woken --
2 that have sleep challenges versus those that are
3 living --

4 Those close versus those far away, we have
5 differences in sleep patterns and challenges, but it's
6 not the turbines that are causing that up to the 46
7 decibels in any of the individuals that live close by.

8 CHAIRMAN HANSON: Gosh. That just -- it seems
9 like you're controverting your testimony when you say
10 that. I'm frustrated by that when you say that --

11 THE WITNESS: Commissioner Hanson, perhaps I
12 could add that, as I indicated earlier, I'm not saying
13 that nobody's ever had sleep disturbance living near
14 turbines. In fact, those older projects, the older
15 models when we're up to 55 decibels and 1,000 feet away,
16 there clearly were sleep disturbances in some of those
17 individuals, and that's why we've lowered the sound
18 standards over the years.

19 So I'm not saying there's never been that case.
20 And that's why I believe that if we take it down to the
21 45 decibels for nonparticipants, we're setting a number
22 that will be protective of people's sleep.

23 CHAIRMAN HANSON: I'm skipping a number of the
24 questions I was going to ask you in reference to that
25 because I don't think we're going to get anywhere.

1 Mr. Hanson asked you a question pertaining to
2 the flicker effect, which I was going to ask you as well,
3 and you explained that it was a term of art for the
4 industry apparently.

5 You also stated that in that -- a following
6 sentence to that, "Instead, it can be observed as an
7 intermittent shadow on the ground that does not cause
8 annoyance."

9 I think I'll just look at that as being asked
10 and answered.

11 I shouldn't get annoyed. Thank you for your
12 testimony.

13 THE WITNESS: Thank you.

14 MS. CREMER: Commissioner Nelson.

15 COMMISSIONER NELSON: No questions.

16 MS. CREMER: Any redirect?

17 MR. MURPHY: No redirect.

18 MS. CREMER: Any follow-up based on Commissioner
19 questions?

20 MR. GANJE: None.

21 MS. CREMER: Staff, did you have questions?

22 MR. MIKAL HANSON: None.

23 MS. CREMER: Thank you for your testimony. You
24 may step down.

25 THE WITNESS: Thank you very much,

1 Commissioners, for your time.

2 (The witness is excused.)

3 MS. CREMER: 2 o'clock we will reconvene.

4 (A lunch recess is taken.)

5 MS. CREMER: Call the hearing back into order.

6 And, Crowned Ridge, you are up.

7 MR. MURPHY: Thank you. That was our last
8 witness. Our direct case is over.

9 MS. CREMER: Thank you.

10 That would take us to the Intervenors. And, as
11 I understand it, you do not have any witnesses to call;
12 is that correct?

13 MR. GANJE: Correct.

14 MS. CREMER: So you had reserved your opening
15 statement before. My understanding of an opening
16 statement is the evidence will show.

17 As you have no witnesses, there's no evidence to
18 show so you'll not do an opening statement; is that
19 correct?

20 MR. GANJE: I don't think it necessary.

21 MS. CREMER: All right. Thank you.

22 Staff.

23 MR. MIKAL HANSON: Thank you.

24 We kind of got somewhat surprised that we're at
25 this point. We have a witness, Tom Kirschenmann, who's

1 with Game, Fish & Parks. I believe he's on the telephone
2 at this point in time. And, Mr. Kirschenmann, are you
3 available by phone right now?

4 MS. CREMER: So we need to go through a few
5 things such as are you asking to allow him to testify by
6 phone, and then we'll need comments from the parties if
7 they're okay with that and then explain the situation
8 with exhibits or lack of internet.

9 MR. MIKAL HANSON: All right. He's out in the
10 southern Black Hills, which does not -- he explained to
11 us he does not have internet service. So questions about
12 specific exhibits would be very kind of tough for him
13 other than his memory of that.

14 And we would ask permission to present his
15 testimony by phone since he's at a meeting, a Game, Fish
16 & Parks meeting, at this time.

17 MS. CREMER: And --

18 MR. MIKAL HANSON: The other option is he can be
19 here in person but tomorrow at 10:00 is what we had
20 talked about him being able to make. So, everybody, it
21 looks like we might get done today, and we'd have to come
22 back tomorrow if we're going to have him in person.

23 MS. CREMER: Okay. So, Crowned Ridge, do you
24 have comments?

25 MR. SCHUMACHER: Thank you. Applicant has no

1 objection.

2 MS. CREMER: And, Mr. Kirschenmann, can you mute
3 your phone, please.

4 MR. KIRSCHENMANN: Yes, I can.

5 MS. CREMER: Thank you.

6 And, Intervenors, do you have comment?

7 MR. GANJE: No objection.

8 MS. CREMER: Commissioners.

9 COMMISSIONER FIEGEN: No objection.

10 CHAIRMAN HANSON: She speaks for me.

11 COMMISSIONER NELSON: I much prefer to have our
12 witnesses in person but I am not going to hold up the
13 show over my preferences and so I will not object.

14 MS. CREMER: Okay. With that then, I will grant
15 the motion to hear it telephonically, unless -- it
16 doesn't appear anyone's going to overrule that.

17 So, Mr. Kirschenmann, you can unmute your phone
18 now, and Chairman Hanson will swear you in. And I think
19 that takes care of everything; is that correct?

20 Thank you.

21 CHAIRMAN HANSON: Mr. Kirschenmann, will you
22 raise your right hand, please, and state your name.

23 MR. KIRSCHENMANN: Tom Kirschenmann.

24 (The oath is administered by Chairman Hanson.)

25 MS. CREMER: Staff, you may proceed.

DIRECT EXAMINATION

BY MR. MIKAL HANSON:

Q. Thank you. This is Staff Attorney Mikal Hanson. For the Commission and the public record, could you state your name and your occupation.

A. My name is Tom Kirschenmann, and I serve as the Wildlife Division Deputy Director and Chief of Wildlife for South Dakota Game, Fish & Parks.

Q. And how long have you been so employed?

A. I've been with the State of South Dakota Game, Fish & Parks since 2008 and have served in a couple of capacities before this position, have been in this position for approximately nine years as the chief of wildlife.

Q. And briefly can you outline your duties and responsibilities?

A. Certainly. As chief of wildlife, I'm chief of the terrestrial section, oversee terrestrial-based management activities for the Department, for all kinds of wildlife, both game and nongame, associated habitat. Also includes Staff that focus on threatened endangered species, research and management of both private and public lands across the State of South Dakota.

Q. Briefly, can you give us your educational background.

1 A. Sure. I attended South Dakota State University
2 where I obtained both a bachelor's and master's degree in
3 wildlife management.

4 Q. Now as part of your duties and responsibilities do
5 you review wind farm applications to determine -- or
6 review their effects on wildlife and the environment?

7 A. Yes. That's part of what falls into the section
8 that I oversee. We have on staff an environmental review
9 senior wildlife biologist that does a lot of that work,
10 and then I also review relevant and pertinent information
11 to applications and do consultation with that position
12 and other staff when reviewing projects such as this.

13 Q. So if I had asked that question better, it would be
14 you and your staff review these things; is that correct?

15 A. That is correct.

16 Q. Are you familiar with Direct Testimony prefiled in
17 this case by you done on May 10, 2019?

18 A. Yes.

19 Q. And it is Staff Exhibit S3. Have you reviewed that
20 prior to this hearing?

21 A. Yes.

22 Q. And outside of my modifications we make in your live
23 Direct Testimony today, you adopt it then, and there
24 doesn't need to be any changes or modifications?

25 A. No.

1 Q. And at the end of that there is a -- kind of a
2 resume or curriculum vitae. Are you familiar with that?

3 A. Yes.

4 Q. And does it fairly and accurately set out your work
5 experience and more of your education?

6 A. Yes.

7 MR. MIKAL HANSON: And it's my understanding,
8 Hearing Examiner, that that's been accepted as already
9 offered and accepted, his Direct Testimony.

10 MS. CREMER: And that's my understanding when I
11 checked.

12 MR. MIKAL HANSON: Thank you.

13 Q. This Crowned Ridge Project, has the Game, Fish &
14 Parks Department been involved in this project for a
15 significant period of time?

16 A. There has been consultation and conversations with
17 our agency, Game, Fish & Parks, with a couple of
18 different staff over the years and goes back at least
19 over -- at least over nine, 10 years of a span with some
20 initial discussions early on and then in recent time as
21 well.

22 So, yes, there have been dialogue and discussions
23 for some time over the course for this project.

24 Q. And I assume if we go back that long that it wasn't
25 Crowned Ridge as the name but under different names. Is

1 that a fair statement?

2 A. That would be my understanding. Correct.

3 Q. Now in reviewing their Application did you -- did
4 you specifically look at things that they were doing in
5 regard to wildlife habitat and vegetation?

6 A. When we review an application for a project such as
7 this we'll look at potential impacts to different types
8 of habitat, potential impacts to wildlife species
9 themselves. We'll look at and consider, for example, the
10 overall project area where it's located, the layout of
11 the project where the turbines are proposed to be
12 constructed in terms of proximity to other types of
13 habitat out there.

14 Q. And if we kind of limit myself at the beginning to
15 habitat, does it appear that Crowned Ridge has attempted
16 to minimize their impact to the habitat in this area?

17 A. Yes. From our review of it, I would say that is a
18 fair statement, in particular, of one of the key things
19 that we look at from a habitat standpoint would be
20 placement of turbines, and with a substantial number of
21 turbines placed in agricultural production fields versus
22 grasslands areas, we would say that that would be a fair
23 statement, that there have been efforts to minimize
24 impacts to habitat.

25 Q. And even more, is wetlands and public lands

1 significant concerns for you?

2 A. Again, those are all habitat types and sites that we
3 will look at based on the project description within the
4 Application. A common recommendation that we offer to
5 developers in consideration of project area and placement
6 of facilities and infrastructure is to avoid, for
7 example, from a wetlands perspective, areas of high
8 concentrations number of wetlands. From the Application
9 there are no turbines being placed in actual wetland
10 basins themselves.

11 But also knowing the location in South Dakota. We
12 have a project area that -- part of the Prairie Pothole
13 Region and the Coteau area. There's always going to be
14 regions with high numbers of wetlands. Impossible to
15 avoid building and putting in infrastructure in areas of
16 wetlands, but in general we don't have any major concerns
17 of this particular project.

18 Q. And it appears they've attempted to minimize that.
19 Would that be fair?

20 A. That would be fair.

21 Q. And there's a thing, what we call fragmentation of
22 important vegetation areas. Is that a -- am I saying
23 that right?

24 A. Yeah. Again, that is another common recommendation
25 that we provide in projects such as this to avoid or

1 minimize to the greatest extent possible of additional
2 fragmentation of habitat out there. Fragmentation can
3 occur in different forms and shapes.

4 One of the things that we always look at in a
5 project like this if there are some larger contiguous
6 tracts of grassland areas, to minimize as best as
7 possible to further fragmenting that, as many grassland
8 birds, in particular, are dependent on contiguous
9 grassland areas.

10 And in general looking at the overall Application
11 and the information available, there were several efforts
12 to avoid fragmentation.

13 Q. And they did that, as you look at the --

14 A. Yes.

15 Q. The footprint of the project?

16 A. Yes.

17 Q. Now you've said this habitat a couple of times.
18 It's the chateau [sic]? Am I saying that -- the glacier
19 chateau, meaning kind of a ridge line of where the
20 glacier left rocks and debris?

21 A. Yeah. It's part of the Coteau, the Prairie Coteau,
22 area of South Dakota.

23 Q. Okay. And does that have some special importance to
24 wildlife?

25 A. The Coteau itself, which is also part of the Prairie

1 Pothole Region of the United States is a unique area and
2 significant area in particular from migratory bird
3 species and, in particular, migratory waterfowl, as the
4 Coteau and the prairie again from that glaciated
5 landscape and the wetland basins and particularly the
6 grasslands associated with them are very productive areas
7 for waterfowl and other wetland and grassland-related
8 bird species in particular.

9 Q. And if we turn to grouse -- in fact, I was actually
10 surprised. There's actually grouse up there in Grant and
11 Codington County in that area?

12 A. Yes, there is. It's an area that does have -- it
13 would primarily be sharp-tailed grouse. There could be
14 remnant pockets of prairie chickens but less likely of
15 that.

16 Most prominently would be sharp-tailed grouse,
17 again, a species that is dependent on grassland habitat
18 and, in particular, larger or greater size expansions of
19 grassland habitat.

20 Q. And in eastern South Dakota is that fairly unique
21 for those species of upland game?

22 A. When you look at the distribution of grouse in
23 South Dakota and, in particular, eastern South Dakota I
24 would offer up that it's part of the state where grouse
25 is basically nonexistent or would be extremely sparse

1 would be what I would consider the southeast corner of
2 the state.

3 We do not have the numbers of sharp-tailed grouse in
4 the northeast corner that we do the central part of the
5 state. But we certainly have pockets and areas where
6 sharp-tailed grouse still remain and do fairly well and
7 in particular up there in that Coteau region because of
8 the associated grassland habitats.

9 Q. A lek is a -- is a name for a breeding ground for
10 the grouse?

11 A. That is correct.

12 Q. And do you have some specifics, education on upland
13 game and grouse?

14 A. What I would offer is throughout my career I've
15 spent a substantial amount of time focusing on upland
16 game birds. For three years for the State of South
17 Dakota I served as the upland game biologist, which
18 includes primary species of pheasant, partridge,
19 sharp-tailed grouse, prairie chicken, and sage-grouse.

20 So I have experience working with grouse and have
21 been associated with projects and management activities
22 related around sharp-tailed and prairie chicken.

23 Q. Your knowledge and experience, are these leks
24 historic used -- often used again and again and again by
25 the grouse?

1 A. That can certainly happen. Leks are a vital
2 component of both sharp-tailed grouse and prairie chicken
3 population from the standpoint that the leks serve as the
4 primary location that's part of that annual life cycle
5 and the reproductive and mating part.

6 Leks are used by the males in particular to display.
7 Each species does it a little bit differently, but it is
8 a displaying ground, if I may call it that, or a
9 courtship ground where the males do that for in some
10 cases up to a month, month and a half in spring where
11 they do their displaying and dancing to attract females
12 to bring females in as part of, again, that annual life
13 cycle. And they're a key element to the retention and
14 sustainability of populations of grouse.

15 Q. Did the Game, Fish & Parks Department recommend a
16 setoff -- well, let me back up.

17 Were there known leks located in the project area?

18 A. Our Staff in communication with the developer did
19 provide some data on some known leks that we were aware
20 of. And, again, I would specify known leks.

21 We would not have the ability to have data or
22 information on every single lek that occurs across the
23 state. We are made aware of leks through ongoing
24 projects, some monitoring that we have done. We could be
25 made aware of leks by the public or landowners contacting

1 some of our local staff.

2 So there's various means that we could have
3 information or data to have -- or to know of known leks.
4 But, yes, we did provide some data to the developer on
5 some known leks that we had available to us.

6 Q. And I saw a map that like in yellow located those.
7 Did you see that map also? Are you familiar with that
8 map?

9 A. I do recall the map, yes.

10 Q. Now did Game, Fish & Parks recommend that there be a
11 setoff from those known leks for infrastructure
12 construction?

13 A. Again, that is a common or the regular
14 recommendations that we provide to projects such as this
15 from the standpoint of prairie grouse, and that's a
16 recommendation of avoiding structures within one mile of
17 a known lek and then avoidance of a two-mile area during
18 the construction phase of development also.

19 Q. And are you aware that Crowned Ridge has agreed to
20 the two-mile during construction from a known lek?

21 A. Yes. I am aware of that.

22 Q. They did not agree to the one-mile, though. Is that
23 your understanding?

24 A. That's my understanding. Correct.

25 Q. Are you aware of any studies up in the -- in this

1 area, Upper Midwest, about whether wind turbines drive
2 away grouse from their leks or draw them into the wind
3 turbines or have no effect?

4 Are you aware of studies regarding that?

5 A. I am not intimately knowledgeable or aware of
6 studies that have shown one way or the other. There have
7 been research projects that have looked at the impacts of
8 birds, and prairie grouse being one of them.

9 We as an agency have actually attempted to look at
10 some of these things internally with some research
11 projects a couple years back trying to determine both
12 prior to construction and postconstruction.
13 Unfortunately, that project, we did the phase where it
14 was prior, and then the development did not happen so we
15 couldn't have that information firsthand.

16 But there are -- there are studies out there and
17 some projects that have looked at these, and similar to
18 many other wildlife studies when you look at these
19 projects there is no conclusive information or data that
20 says one thing or the other. There are instances where
21 it would show birds being impacted, and seeing limited
22 use or no longer using the areas and other instances
23 there seemed to be no impact.

24 And so that could vary by species. It could vary by
25 location. So, again, there's no conclusive evidence

1 showing one way or the other.

2 Q. Is this an area where more study would be
3 beneficial?

4 A. Any additional information and data that we could
5 gather from that question would be very helpful not only
6 understanding the overall impacts if they exist to
7 prairie grouse species, but also that could be used for
8 future recommendations and management considerations in
9 terms of projects like this or other types of
10 developmental projects.

11 Q. Are you aware of the Staff has drafted a proposed
12 condition in regard to grouse lek monitoring that has
13 been recommended that the Commission adopt? Are you
14 aware of that?

15 A. Yes.

16 Q. And it talks about having a two-year study during
17 the lekking season, I believe, or during that period to
18 see what is happening to the grouse. Is that fair?

19 A. Yes. That would be a fair statement.

20 Q. And it's postconstruction, that this would happen
21 postconstruction.

22 A. That is correct.

23 Q. So the condition would not prevent the project from
24 being built, and it wouldn't require the project
25 developers to go out there and look for other known lek

1 sites; is that fair?

2 A. That is correct. The concept is to monitor the
3 known leks that would -- that are known out there, and
4 then specifically the ones that would be found within one
5 mile of a turbine and monitor that, survey it for a
6 length of two years to see if any types of impacts can be
7 determined of no longer using it or it's not an issue to
8 the birds using those particular leks.

9 Q. You probably haven't been in the private sector
10 much, but, I mean, would this study be complicated or
11 expensive, in your opinion?

12 A. I don't believe it will be. From a monitoring
13 standpoint and in visiting with our current upland game
14 biologist who has some extensive background and
15 experience surveying grouse -- in my time in surveying
16 grouse, with the number of leks known within the one-mile
17 distance we would be looking at less than 10 known leks,
18 and it would probably require visitation of those leks
19 probably two or three times during the spring season.

20 And based on location of some of those leks, I would
21 anticipate more than one lek could be surveyed in a given
22 morning on a given day. And so full anticipation, your
23 best estimate would be a requirement of approximately,
24 I'll say, 15 days worth of monitoring in the spring. But
25 that monitoring would not be a full day, as lek surveys

1 are conducted for approximately a two- to three-hour time
2 span in the early morning is the most conducive time
3 period to do that but would look at approximately 15 days
4 worth of surveying effort.

5 Q. And that information could very well be important
6 for future wind farm development in the state?

7 A. Again, yes. That type of information would be very
8 useful in the grand scheme of knowing and better
9 understanding those potential impacts, gathering
10 information from this particular site, and looking at too
11 the attempt to gather similar information from other wind
12 farms in their totality could be very valuable
13 information.

14 Number one, it could be important and valuable when
15 we have those preliminary discussions with developers on
16 wind farms and those conversations again to keep in mind
17 when we do offer those recommendations. And then the
18 other side of this that we look at from the value of that
19 type of information is having a better understanding and
20 maybe some insight as to additional cumulative impacts of
21 multiple wind farms in a general area being developed, as
22 I know that we have had discussions on other projects of
23 potential cumulative impacts and this could be one piece
24 of that puzzle in determining and having some of that
25 information.

1 Q. To your knowledge, has Staff, with your input --
2 with Game, Fish & Parks's input asked that these surveys,
3 lek surveys, be done in other projects other than just
4 this one?

5 A. Yeah. We do know that there is another wind farm
6 that is submitting an Application -- has submitted an
7 Application that has agreed on a voluntary basis to do
8 this same type of effort, a two-year postconstruction of
9 leks within one mile of a turbine.

10 Again, it's in a different part of the state, but,
11 again, that collective information and data can be very
12 useful when we have these discussions on a statewide
13 basis on development projects as well as individual
14 projects themselves.

15 Q. Do you know the name of that project just off the
16 top of your head?

17 A. Yes. I'm sorry. It's the Sweetland Wind farm.

18 Q. Okay.

19 MR. MIKAL HANSON: Ms. Cremer, we would tender
20 this witness for cross-examination.

21 MS. CREMER: Thank you.

22 Crowned Ridge.

23 MR. SCHUMACHER: Thank you.

24

25

CROSS-EXAMINATION

BY MR. SCHUMACHER:

Q. Mr. Kirschenmann, this is Miles Schumacher. I'm one of the attorneys for the Applicant, Crowned Ridge Wind farm. I have just a couple of questions for you. And really it's clarification.

In your testimony you indicated a strong interest in monitoring grouse leks within one mile from wind turbines; is that correct?

A. Mr. Schumacher, yes, that's correct.

Q. So does that replace your earlier recommendation that there be no turbines located within one mile of the grouse leks?

A. The focus of the request and the recommendation is to monitor the leks within one mile of a turbine, understanding at this point of an application in the layout that turbine locations are likely not going to be moved. So our ask is the consideration of looking at and monitoring those leks within one mile of any turbines that are out there of those known leks.

Q. Thank you.

Just one other question. Am I correct that your testimony was that you're not aware of any conclusive studies that indicate the appropriate turbine setback from grouse leks?

1 A. That is correct, Mr. Schumacher. Those different
2 research projects out there have seen different levels of
3 impact on grouse at varying distance levels from very
4 close proximity on up to a couple of miles out.

5 And, again, so there's no conclusive evidence of
6 what that distance should be or what overall impact it
7 may or may not have on some of those leks.

8 MR. SCHUMACHER: Thank you. No further
9 questions.

10 MS. CREMER: Thank you.

11 Intervenors.

12 MR. GANJE: Thank you.

13 CROSS-EXAMINATION

14 BY MR. GANJE:

15 Q. Mr. Kirschenmann, this is David Ganje, and I am
16 representing the Intervenors in this case. And I'd first
17 off like to say I think you have one of the best jobs in
18 the world. So I'll have a few questions for you.

19 A. Okay. Please proceed.

20 Q. Do you know of any mammal surveys that were
21 completed on this project?

22 A. Mr. Ganje, off the top of my head I do not recall
23 any mammal surveys conducted in this project area.

24 Q. And I'm jumping to another species or another sort
25 of animal.

1 I think you cited in your testimony that there was a
2 recent research project done in this state and in North
3 Dakota that showed seven of nine species of grassland
4 birds had been reduced -- in fact, had reduced densities
5 around wind turbines over time; is that correct?

6 A. Yes. There is a study that was conducted, and the
7 authors of that are Schaffer and Buhl, that looked at
8 wind farms in South Dakota and North Dakota to try to
9 ascertain the potential impacts of wind turbines to
10 grassland bird species in particular, and there were some
11 species that they did determine some impacts from the
12 standpoint of displacement or dispersal at distances,
13 varying distances from the turbines themselves.

14 And then there were, again, as I mentioned a little
15 bit ago on -- conclusive of study, there were also some
16 species that were not impacted. But that is probably one
17 of the most discussed papers that are out there and
18 studies that are out there, primarily in this area
19 because of the scope of that particular study being the
20 length of it. It was, if I remember correctly, almost a
21 10-year study.

22 And probably even more importantly is the geographic
23 location of that study being conducted in the Dakotas,
24 which is why it's typically referred to as it's probably
25 the most relevant study to this part of the country.

1 Q. Thank you.

2 And I think it was also your testimony that it is
3 important to perform preconstruction wildlife surveys
4 with a high degree of scientific rigor; is that correct?

5 A. Yep. We always want to have those surveys done of
6 different wildlife species out there using methods that
7 can be looked upon as, you know, scientific approach,
8 have the potential to have that statistical validity to
9 it, and it gives us the opportunity, whether it's some of
10 our staff or other agencies, to look at it and the best
11 opportunity to review it and have those conversations and
12 see -- and try to determine or ascertain if there's any
13 potential concerns or items that should be further
14 discussed.

15 Q. And do I understand that part of your work was
16 reviewing an Avian Use Survey report done in --

17 A. Yes.

18 Q. Let me finish, please. Done in Grant and Codington
19 County by an environmental study group called SWCA?

20 A. Yes. I know our staff in particular reviewed that
21 work. Correct.

22 Q. And your observations with regard to this project
23 are based in large part on a review of that work; is that
24 correct?

25 A. That is correct.

1 Q. Now you don't have the benefit of documents in front
2 of you. Maybe it's a blessing. But I'm going to say a
3 statement from the introduction of that survey.

4 The last sentence of the introduction indicates
5 that, "This report summarizes the methods and results of
6 large and small bird use surveys conducted from April 1,
7 2017, through November 30, 2017, in the study area." You
8 may not recall that, but I'm refreshing your memory as it
9 were.

10 Okay. Now --

11 A. Okay.

12 Q. -- the end of that study was done on November 30 of
13 2017, the study I referred to.

14 A. Okay.

15 Q. My concern is that this Applicant on November 22 of
16 2017 purchased the so-called Cattle Ridge properties or
17 Cattle Ridge product, which is the northeasternmost
18 portion of this irregularly shaped proposed project.
19 That acquisition or closing or sale date, whatever we
20 want to call it, occurred on November 22, 2017.

21 So are you aware of whether the consulting group we
22 referred to a moment ago did an avian survey on that
23 northeasternmost portion of the proposed project commonly
24 previously referred to as the Cattle Ridge Project?

25 A. Yeah. Mr. Ganje, I am not aware of any surveys that

1 were conducted in that geographic area that you are
2 describing.

3 Q. Okay. Well, considering the rigorousness with which
4 you suggest that you, as a policy, prefer to implement,
5 I'm going to suggest that if that consisted of about
6 15,000 acres of land, would that be an area that you
7 would want to survey for the purpose of making
8 recommendations concerning this proposed project?

9 A. Not having a complete picture of all the information
10 and the ability to review that is -- I would suggest an
11 offer is always the best approach.

12 Q. Now there is a little bit of gap between the closing
13 date on the Cattle Ridge Project and the date of
14 completion under the introduction to the avian project
15 study report that I said to you.

16 Would it be possible between November 22, 2017, and
17 November 30 of 2017 to conduct a rigorous avian study on
18 that portion of the land I've described for you a moment
19 ago?

20 A. Mr. Ganje, could you repeat the dates of that window
21 or time frame?

22 MR. GANJE: In view of the horseness of my
23 voice, I will respectfully ask the court reporter to
24 kindly read back the question.

25 (Reporter reads back the last question.)

1 THE WITNESS: Thank you for repeating that. My
2 apologies. Sometimes difficult over a cell phone.

3 A. Looking at those dates in the consideration of doing
4 a bird study in that area, I would have to say no based
5 on less than a 10-day time frame, and that would not be
6 the ideal time of the year to do such a bird evaluation.

7 MR. GANJE: No further questions.

8 MS. CREMER: Thank you.

9 That will take us to Commission questions. And
10 I show Chairman Hanson.

11 CHAIRMAN HANSON: Good afternoon,
12 Mr. Kirschenmann.

13 THE WITNESS: Good afternoon, Commissioner.

14 CHAIRMAN HANSON: You referred to the Schaffer
15 Buhl study, and that's one that we are familiar with. Do
16 you feel that there's a need to examine that study for
17 some enlightenment on this issue?

18 THE WITNESS: Commissioner, I don't know that
19 there's a necessity to review the paper itself and the
20 study itself. It certainly has application based on the
21 result of that study no different than probably any other
22 wind farm project or development project in that part of
23 the state.

24 Again, as I mentioned earlier, it continues to
25 be probably one of the primary references that are shared

1 with people from the standpoint of development
2 considerations and those potential impacts. Probably the
3 most, again, relevant piece of that information from that
4 study is seeing that it was determined that some species
5 of grassland-dependent birds were determined to have some
6 displacement or disbursement from wind turbines.

7 And, again, that would coincide with our normal
8 recommendations that we offer up as an agency as well to
9 avoid to the greatest extent possible of placing
10 infrastructure on grassland habitats.

11 CHAIRMAN HANSON: Thank you.

12 In your testimony you state that the GFP does
13 not have regulatory authority when it comes to permitting
14 wind farm projects. And you also state that your role is
15 to consult with developers and provide recommendations
16 and suggestions on how to minimize or remove potential
17 impacts to wildlife and associated habitats.

18 Sometimes recommendations and suggestions are as
19 good as commandments. Do you feel that you have that
20 opportunity with wind farms?

21 THE WITNESS: Commissioner, I would say in many
22 cases I would say our discussions and recommendations do
23 make a difference. They are accepted. At times
24 recommendations or suggestions could be taken as whole,
25 could be taken as part.

1 So I do believe at various places, different
2 times, various projects that our recommendations do play
3 a good role in trying to minimize those potential impacts
4 to wildlife and associated habitat.

5 I can't speak for you if they're as good as --
6 recommendation and suggestions as good as actual policy
7 decisions or regulatory or conditions put in place. But,
8 again, we are hopeful that our consultations and
9 providing such information can just be a positive
10 component of the overall decision process and be a
11 positive component in the decisions of construction,
12 layout, and things of consideration from a project
13 itself.

14 CHAIRMAN HANSON: You testified that CRW has
15 agreed to some of the recommendations and requests. You
16 highlighted one pertaining to the one mile, for instance,
17 as one of the situations where they did not agree to.

18 Are there any other recommendations that you may
19 have concern over that they did not accept?

20 THE WITNESS: Commissioner Hanson, I would say
21 the one that you just mentioned there was probably the
22 one that we talked about the most. And I say "we" being
23 internally with staff and myself looking at it.

24 As discussed earlier and per some other
25 questions from fragmentation, avoidance of some areas,

1 totally understand in these projects and in particular
2 the areas where a lot of these projects are being
3 constructed, and this being one of them, it is extremely
4 difficult and very challenging to avoid, again, all the
5 grassland habitat and being in proximity of wetland
6 basins and those things.

7 So we want to provide those recommendations
8 that, you know, understand that it cannot be avoided or
9 minimized to 100 percent. So in the grand scheme of this
10 particular project, from our review of the Application
11 and the information, a lot of those items that we offered
12 up as recommendations/suggestions we do believe that were
13 considered, looked at, actions taken, again,
14 understanding that not everything can be minimized or
15 avoided 100 percent.

16 And then the one that you described and brought
17 forward here, the one recommendation that we do offer
18 from prairie grouse is the one-mile avoidance of an
19 individual turbine to a lek. And then a two-mile buffer
20 during construction has been accepted. The one mile
21 within a turbine was not.

22 I believe within the Applicant the approach was
23 taken at .3 miles. Understand that there might be
24 circumstances or situations that would preclude the
25 ability to completely be outside of the one-mile setback

1 area or buffer, if you want to call it that.

2 And, hence, as I mentioned earlier, the reason
3 why we gave that recommendation knowing that there are
4 grouse in the area, the grassland habitat, the close
5 proximity of other wind farms in the geographical area,
6 we primarily offered up the one-mile recommendation as a
7 means of -- to better understand that potential impact to
8 grouse and then to use that information also for future
9 discussions and considerations to those impacts.

10 CHAIRMAN HANSON: You've spoken a lot -- you've
11 discussed quite a bit about avian ground species.
12 Doesn't quite sound right when I say that.

13 What about the migration of the birds, of
14 different birds? We haven't really discussed those.
15 What about concern with avian migration?

16 THE WITNESS: Yeah. Thank you for that
17 question, Commissioner.

18 And that's one that honestly I wish we as a
19 conservation community had some better information and a
20 better understanding of what that potential impact may or
21 may not be for migratory birds.

22 Waterfowl in particular. That is the one that
23 is brought up most to us. The question to us in
24 particular again when you think about the geographical
25 area of the state where this particular project is under

1 consideration to be located, as well as other ones, we
2 have had this discussion even with you as the PUC
3 Commissioners as well.

4 As we have more farms, wind farms, develop and
5 there's more development out there and in particular in
6 closer proximity, I do believe that's something that we
7 have to somehow figure out how we can actually collect
8 some information or data to have somewhat of a better
9 perspective and understanding of it.

10 Unfortunately, Commissioner, I just can't give
11 you a good, definitive answer as to what that potential
12 impact may or may not be to migration or to individual
13 migratory species with the development of these
14 particular projects.

15 CHAIRMAN HANSON: Thank you. There was -- there
16 were a number of questions and discussion centering
17 around minimizing the impacts, and all of those
18 discussions, at least from what I can recall, used the
19 word "attempted." So in regards to impacts, was there an
20 attempt to minimize. And, of course, you stated yes,
21 that there was an attempt.

22 That's a pretty wide door just to state
23 "attempt." Do you believe that the Applicant
24 sufficiently minimized their potential impact?

25 THE WITNESS: Commissioner Hanson, from some of

1 the main pieces of information that we looked at and
2 assessed and evaluated, I would say that over all there
3 was a good attempt to avoid or minimize some of those
4 impacts.

5 Again, as I mentioned a few minutes ago, one of
6 the greatest challenges, I believe, in a development
7 project such as a wind farm in this general part of the
8 state, you know, one of the things that we continue to
9 bring forward, is the conversations about grassland
10 habitats and wetland habitats. And when you're talking
11 about the part of the state that has some very key
12 grassland areas, again, mentioning that it's on the
13 Prairie Coteau and the Prairie Pothole Region, to avoid
14 100 percent I would offer up it is basically impossible
15 in this part of the state just based on the geographic
16 and -- geographic location and the topography of the
17 land.

18 Again, one of the key things that we do look at
19 is turbine placement from various different types of
20 grassland habitats to ground that is already disturbed,
21 in particular agricultural fields and lands. We often
22 and continue to recommend to the great extent possible to
23 put those turbines in undisturbed lands instead of native
24 grassland habitats and such.

25 And in this particular project based on the

1 information that we looked at in place and stuff, there
2 was certainly a higher level of those being placed in
3 agricultural lands, which we looked upon as a positive.

4 CHAIRMAN HANSON: What type of -- I believe this
5 is my last question.

6 What type of activities will GFP be involved in
7 post -- I shouldn't say it in a positive -- if the
8 Applicant receives a permit, what activities will you
9 pursue during construction and operation?

10 THE WITNESS: Commissioner Hanson, I would
11 expect that our agency and staff would work with the
12 developer to devise and set up -- for example, if the lek
13 survey monitoring does move forward, number one, assist
14 or provide recommendations in setting that up in the most
15 efficient and effective means possible to gather that
16 information.

17 I've even had the thought of how we could
18 potentially expand those efforts internally with our
19 staff not only at this particular site but maybe some
20 others, not only to assess and use the information but
21 even take it farther beyond two years to see how we can
22 do more.

23 So we want to be there to provide
24 recommendations on the approach of those things.
25 Probably just as important or more important, as any

1 additional data is collected from any wildlife surveys or
2 monitoring, which will be done, is that annual
3 consultation of when reports are provided to us. If
4 anything is of concern or a red flag of potential, to go
5 back and have conversations with the developer and see if
6 we can devise means or mitigation or some operational
7 decisions to help minimize those impacts.

8 CHAIRMAN HANSON: Thank you very much for your
9 testimony. Appreciate it, Mr. Kirschenmann.

10 THE WITNESS: Thank you, Commissioner.

11 COMMISSIONER NELSON: Tom, this is Commissioner
12 Nelson. Thanks for being on the line to help us out
13 today. I've got two questions. One is relevant and one
14 is not and I'm going to start with the not.

15 THE WITNESS: Very good.

16 COMMISSIONER NELSON: Recent media reports said
17 that there was a black bear in the Twin Brooks area, and
18 I'm wondering, to your knowledge, is that black bear
19 still wandering around the project area?

20 THE WITNESS: Commissioner Nelson, yes, we have
21 had reports and obviously confirmed a bear in the area.
22 I cannot tell you today where that bear is at or if it's
23 still in that area. I have not received any reports
24 recently. I'm going on that assumption that it has moved
25 on to where it came from.

1 COMMISSIONER NELSON: Okay. Thank you.

2 The serious question for the day, you know,
3 you've spent a great deal of time talking about the real
4 lack of serious scientific analysis as to what is
5 appropriate and what is not so far as a distance of a
6 turbine from a lek.

7 And so my question is how did you settle on the
8 one-mile figure? Why not a half-mile? Why not two
9 miles? How did you arrive at one mile?

10 THE WITNESS: Commissioner Nelson, that's a
11 really good question. Over the years that we've looked
12 at this particular discussion topic related to wind
13 farms, obviously looked at other studies that have been
14 done across the country with different species of grouse,
15 of prairie grouse, from prairie chicken to sharp-tailed
16 grouse to greater prairie chick and even sage-grouse.

17 And I will offer up to you that across the
18 country there are different distances that are offered up
19 as a "setback" or buffer. There has been different
20 pieces of information that have come up in projects that
21 have shown that, you know, at a quarter of a mile there
22 was a higher level of disturbance or displacement. At a
23 half-mile it wasn't quite as much. At a mile it was a
24 little bit lesser on up to different projects all the way
25 out to 3, 4, maybe even up to 5 miles.

1 We also look and take into consideration what
2 other setbacks are being offered by other state wildlife
3 agencies across the country to relevant species as we're
4 talking about. And, again, that ranges from probably a
5 half-mile or less all the way up to 3 to 5 miles.

6 And so I will offer to you the one-mile distance
7 that we recommend is honestly a number that falls within
8 range of from various other projects. I don't have any
9 specific scientific data or information that I can share
10 with you that says here it pinpoints that one mile is the
11 magical distance. It's more based off of an accumulation
12 of review of other projects, recommendations, and looking
13 at something that makes sense from the biology of the
14 species to it also is reasonable from the standpoint of
15 consideration in developing a project such as this.

16 COMMISSIONER NELSON: Thank you. I'm going to
17 take the liberty of asking one further question. When
18 you've talked about what you've observed so far as
19 recommendations elsewhere in the country, are any of
20 those recommendations in the one-third mile area?

21 THE WITNESS: Off the top of my head,
22 Commissioner, I can't say yes or no on that one. I know
23 there are some distances less than one mile that are
24 offered up, but I just can't remember any specifics and
25 something in particular to .3.

1 COMMISSIONER NELSON: Very good. Thank you.

2 THE WITNESS: Thank you, Commissioner.

3 COMMISSIONER FIEGEN: Thank you for being on
4 line. This is Commissioner Kristie Fiegen. And I know
5 this docket has been moving, and we moved you up.

6 There's been a lot of moving parts, and one of
7 the moving parts is certainly the turbine locations.
8 And, you know, they -- it's certainly been at the
9 eleventh hour. In your testimony you talk about 19
10 turbines being placed on native prairie land or prairie
11 grasses.

12 Has the Applicant given you new numbers that
13 that 19 may be different because of some of the changes
14 that just happened in the last few days?

15 THE WITNESS: Commissioner Fiegen, in response
16 to that, no, I do not have any new figures, nor do I
17 believe that our environmental review biologist has any
18 new figures. We derived that from the information that
19 was in the Application itself.

20 So I do not have anything more new if I may put
21 it that way.

22 COMMISSIONER FIEGEN: Okay. Thank you. And I'm
23 just going to ask the Applicant to file that information
24 so the Commissioners have that when we make our final
25 decision.

1 Also you certainly reference the 2016 Schaffer
2 report and shows seven of nine species. Do you remember
3 any of those species that were impacted in this study?

4 THE WITNESS: Commissioner Fiegen, I'll be
5 honest. You caught me off guard. No. Right off the top
6 of my head I don't remember the list of the species,
7 other than the fact that they are grassland dependent
8 pasturing type birds. I'm drawing a blank.

9 Q. Do you know if grouse -- I'm sorry. You can
10 continue.

11 THE WITNESS: No. I just was going to say that
12 I don't remember the specific list right off the top of
13 my head.

14 COMMISSIONER FIEGEN: Do you know if prairie
15 chickens or grouse were one of them?

16 THE WITNESS: That I can state that, no, prairie
17 grouse were not part of those particular list of that
18 species.

19 COMMISSIONER FIEGEN: Okay. And I'll probably
20 mostly ask Mr. Kearney this question, but because you're
21 on line and I might not be able to get you back on
22 because of cell phone coverage that Commissioner Nelson
23 hasn't fixed in the southwest part of our state yet as a
24 Commissioner --

25 So this monitoring, this Staff proposal of the

1 electric monitoring condition, I guess as a Commissioner
2 what happens if we're seeing that these leks within one
3 mile -- there's a disturbance. Okay. This is a
4 condition, but what are we going to do if it impacts
5 these leks?

6 Are we going to ask them to shut down the
7 turbines that March, April, and May or -- and I'll
8 probably ask Mr. Kearney this question so you don't have
9 to feel like you have to answer it, but since you're on
10 line, I just want to give you an opportunity to.

11 THE WITNESS: Sure, Commissioner Fiegen.

12 I guess what I would offer up is if information
13 that would be collected would show in particular even
14 after that time frame of two years and collecting that
15 data would indicate or predict that there is an impact, I
16 believe that gives an opportunity to have that discussion
17 for some potential operational adjustment to those
18 particular turbines.

19 I don't believe in general that it would be a
20 requirement to "shut them down" for a three-month period.
21 What there might be, though, is -- again, speak out loud
22 hypothetical, that it could be an operational adjustment
23 where from a lek perspective in particular, the peak
24 activity and the importance of that activity occurs in
25 the early morning for an approximately a two- to

1 three-hour time span and that varies from day to day. So
2 maybe there are some daily operational adjustments that
3 can be made that would lessen the potential impacts if we
4 determine that something is going on there.

5 So that would be just one thought I have that I
6 would share with you as a potential outcome of something
7 of that nature, again, an operational adjustment.

8 And then I would offer up secondly is if we do
9 determine from collecting that type of information from a
10 project such as this and some other ones, I believe then
11 that gives us a stronger discussion in those
12 recommendations why there is the importance of having a
13 distance of whatever that might be from a known lek.

14 So I would offer those two potential outcomes
15 that could come as a result of having that information.

16 COMMISSIONER FIEGEN: Thank you. And you'll get
17 to listen to the recording to see what Mr. Kearney says
18 later. And I certainly appreciate that. And as a
19 Commission you know we look at substantial impacts to the
20 habitats so I appreciate that.

21 Thank you.

22 THE WITNESS: You're very welcome, Commissioner.

23 COMMISSIONER NELSON: So this is Commissioner
24 Nelson again. I'm going to -- follow-up question. This
25 postconstruction monitoring of the leks is going on and

1 it's determined that a historic lek is no longer being
2 used, how do you determine whether that's because a
3 turbine has been placed there or there's some other
4 environmental issue going on that there's no longer
5 grouse in the area?

6 THE WITNESS: Commissioner Nelson, that's a
7 really good question. Conducting the surveys themselves
8 and monitoring those leks, you're right, could not
9 ascertain that that is the sole and only reason for a lek
10 abandonment or a lek all the sudden not in place. There
11 could be other compounding factors out there, something
12 that we're not simply aware of.

13 The importance then from that standpoint is you
14 do the same method. You do the same approach for all the
15 leks that are within a mile and you determine if the same
16 thing is happening on all the leks. It becomes easier to
17 have that discussion and probably come to some
18 conclusions of what are the determining factors what
19 caused those birds to no longer use those leks.

20 Some of them might be the distance dependent
21 from the turbine itself. Some of those things would have
22 to be taken into consideration as well.

23 So you're going to have to look at leks
24 individually, and you have to look at leks in a
25 collective sense as well and see what kind of trends and

1 responses occur to help make some of those
2 determinations.

3 COMMISSIONER NELSON: Thank you. It would seem
4 to me in order for a valid survey, you'd also have to
5 have a control group of leks that are in the area and but
6 not close to turbines in order to do that accurate
7 comparison.

8 But that's not being proposed here; is that
9 correct?

10 THE WITNESS: That is correct, Commissioner.

11 COMMISSIONER NELSON: Thank you.

12 COMMISSIONER FIEGEN: I do have one more
13 question. Although you didn't hear the testimony
14 yesterday probably -- or was it today? I can't remember.

15 Aviation [sic] surveys and lek surveys to find a
16 lek, are they different? Is it more comprehensive to
17 have -- I guess I don't even know. I mean, are aviation
18 surveys the same as lek surveys, or are there designated
19 surveys that can find a lek more comprehensively?

20 THE WITNESS: Commissioner Fiegen, from my
21 knowledge and experiences when it comes to lek surveys
22 and doing other type of avian surveys, they're two
23 different things. When you do a general -- from the
24 context of doing some avian surveys, in particular when
25 you're talking about grassland-dependent species and the

1 various types of birds, there are different methods to do
2 those surveys from point counts to actual transects to
3 some other different methods to do it.

4 From the standpoint of a grouse lek survey, it
5 can be and it is more time-consuming and has to be very
6 thorough. And I say that from the standpoint of when
7 you're looking for those leks, typically sharp-tailed
8 grouse and prairie chickens use ridges or knolls and may
9 say that as a lek, and the primary reason why they do
10 that is so that the sound that they make while displaying
11 on the leks carry a long distance again for the
12 attraction of the females.

13 That being said, it's not as -- it's not as
14 simple to determine leks out there with a standard or
15 some of the standard methods of other avian bird surveys.
16 You have to physically be out on the ground looking for
17 them or having some firsthand knowledge of where some
18 are.

19 I would also share with you that when you're out
20 there doing listening for leks it is two different -- two
21 different complexities and challenges of hearing a
22 sharp-tailed grouse lek versus a prairie chicken lek.

23 If you had a very quiet morning and you had both
24 a sharp-tailed grouse and a prairie lek within a
25 reasonable distance of you, the likelihood that you even

1 hear the sharp-tailed lek would be very, very minimal
2 because likely the prairie chicken lek would make so much
3 louder noise that you wouldn't be able to hear or detect
4 the sharp-tailed grouse lek.

5 So I just give that example that even at times
6 when we do sharp-tailed grouse lek surveys and if you're
7 in an area that has a high number of Canada geese in the
8 area, you could have a very quiet morning and you could
9 have geese making a lot of noise and it's a challenge to
10 even hear the lek.

11 So you have to be very thorough and spend a lot
12 of time on the ground doing some very methodical and very
13 thorough searching to find and locate them at times.

14 And, in particular, up in that part of the state
15 where leks and sharp-tailed numbers are lower and fewer
16 than in other parts of the state, it could be some
17 challenges at times to even find the lek themselves.

18 COMMISSIONER FIEGEN: I'm sure my son next
19 semester would love to get out of class from SDSU and go
20 do this.

21 So my question is did you say you got to see the
22 Staff's proposed lek monitoring condition? I'm sorry. I
23 can't remember.

24 THE WITNESS: Yes, Commissioner.

25 COMMISSIONER FIEGEN: Okay.

1 So as a Commissioner when I look at this
2 condition, if I understand you right, the base would be
3 very important. So the determination of where those leks
4 are is going to be extremely important in order to have
5 the monitoring to add value, would you say? I mean,
6 that's just my thought process as a Commissioner.

7 THE WITNESS: Yeah. And, again, Commissioner,
8 the condition that has been talked about and discussed is
9 to focus on those leks that are known out there or
10 documented and those that within one mile did not ask or
11 place in the condition to search the entire project area
12 again, and there was the focus on the ones that were
13 known or documented, whether that was determined by
14 information and data that we as an agency provided of
15 known leks and then any leks that were found by the
16 company itself or the developer during their other survey
17 efforts or other means of determining or knowing that
18 there is a lek out there.

19 COMMISSIONER FIEGEN: Okay. And I'm going to
20 have to go read the transcript after Cheri's done with
21 it. But I believe Crowned Ridge only did a very high
22 level, which I think their person that talked about it
23 stated that that was reviewing their leks, but when you
24 get down to it that might have been more of an aviation
25 study.

1 So Crowned Ridge's studies may not have done
2 anything on finding leks. But I'm going to go back and
3 read the transcript so I can understand that and make a
4 decision on this condition.

5 Thank you.

6 (Discussion off the record.)

7 MS. CREMER: Redirect. Staff.

8 REDIRECT EXAMINATION

9 BY MR. MIKAL HANSON:

10 Q. Mr. Kirschenmann, in your Prefiled Direct Testimony
11 did you attach this study that the Commissioners have
12 asked you about, this Schaffer Buhl study?

13 A. Mr. Hanson, I believe that was an attachment that we
14 provided as just as a reference to that study.

15 Q. I'm going to provide it to the Commissioners. There
16 was a question about which species were part of that
17 study, and I think it shows.

18 MS. CREMER: You can just tell us, and they can
19 pull it up on their -- or do you have it there? It
20 doesn't matter.

21 (The document is distributed.)

22 Q. If I understand your testimony again that was asked
23 on redirect, first that you do -- if they accept the mile
24 setback, are you -- do you request a study if they're a
25 mile back?

1 A. Mr. Hanson, I guess if no -- if none of the known
2 leks were within one mile of a turbine, I would say that
3 that would not be a necessity to do that.

4 Q. All right.

5 A. So I guess it would be contingent upon the placement
6 of the turbines.

7 Q. And as you -- are you under the understanding that
8 Crowned Ridge has placed turbines within .3 miles of
9 known leks?

10 A. That is my understanding.

11 Q. And so based on that is the recommendation by the
12 Staff and your department that there should be some
13 surveys. Is that --

14 A. That is correct.

15 Q. My understanding of that correct? Okay.

16 A. Yes.

17 Q. Now this northeast part of the project that was
18 Cattle Ridge, do you know enough about the history to
19 know that that was kind of identified as Cattle Ridge?

20 A. I do not, no.

21 Q. Okay.

22 MR. MIKAL HANSON: I don't have any further
23 redirect questions.

24 MS. CREMER: Thank you.

25 That will take us to recross. Again, only to

1 Commission questions and redirect. Crowned Ridge.

2 MR. SCHUMACHER: Crowned Ridge has nothing
3 further. Thank you.

4 MS. CREMER: Thank you.

5 Intervenors.

6 MR. GANJE: Intervenors has no further
7 questions.

8 MS. CREMER: Thank you.

9 Final redirect, Staff.

10 MR. MIKAL HANSON: None.

11 MS. CREMER: Well, I was going to tell you you
12 can step down, but you do whatever you want, Tom. But
13 you are excused, and thank you for joining us.

14 THE WITNESS: Thank you again, and I do
15 apologize for the inconvenience of doing this over the
16 phone. I do appreciate your accommodation today.

17 MS. CREMER: Thank you.

18 (The witness is excused.)

19 MS. CREMER: Let's take a break until 3:30.

20 (A short recess is taken.)

21 MS. CREMER: I'll call this back into session.
22 Staff.

23 MS. EDWARDS: Staff calls Paige Olson.

24 (The oath is administered by the court reporter.)

25

DIRECT EXAMINATION

BY MS. EDWARDS:

Q. Ms. Olson, can you please state your name for the record.

A. Yes. It's Paige Olson.

Q. Where do you work?

A. I work for the South Dakota State Historical Society.

Q. And what is your job title there?

A. I'm the review and compliance coordinator.

Q. Can you briefly explain what that entails.

A. So my job is to ensure that state and federal agencies are taking into consideration cultural resources as defined under state and federal law.

Q. Okay. Did you submit prefiled testimony in this docket?

A. I did.

Q. And do you have that in front of you?

A. I do.

Q. And, for the record, that has been previously stipulated to and admitted as Exhibit S4. If I asked you the same questions today as in your prefiled testimony, would your answers be the same?

A. No.

Q. Can you explain?

1 A. So I did the testimony prior to receiving the
2 architectural survey report, and we have since received
3 it and reviewed it and have no concerns. And now we are
4 just waiting on the survey report for the ancillary
5 facilities.

6 Q. What is the ancillary facilities report?

7 A. So that would include the access roads, crane paths,
8 collection lines, O&M facilities, and the concrete batch
9 plant and lay down areas.

10 Q. Other than what you just mentioned, do you have any
11 additions or corrections to make to that testimony?

12 A. I don't.

13 Q. Are you aware of any outstanding surveys other than
14 that one that you just mentioned that need to be
15 completed?

16 A. I'm not.

17 Q. Do you know if they've completed a Level III
18 archaeological survey?

19 A. They have for several different portions of the
20 project.

21 MS. EDWARDS: And I'm going to ask Mr. Paulson
22 to hand you Exhibit A61. It should be up there, I
23 believe.

24 Q. Do you have that in front of you?

25 A. I do.

1 Q. Can you please turn to paragraph number 13.

2 A. Yes.

3 Q. Are you familiar with that condition?

4 A. Yes.

5 Q. Does it address any concerns you might have?

6 A. It does.

7 Q. Okay. And with that, can you please briefly
8 summarize your testimony.

9 A. Yes. So I've reviewed the survey reports, and
10 they -- the company worked closely with the tribes from
11 that region and they identified a number of traditional
12 cultural properties which were documented and recorded
13 and they've stated that they're going to avoid those
14 sites.

15 And then they found several -- I'm not sure how
16 many -- archaeological properties. And I commented on
17 those as well. And there were no concerns with the
18 architecture.

19 So as far as I'm concerned, we have no real concerns
20 until we see this final survey report.

21 MS. EDWARDS: Thank you. I have nothing else.
22 I will tender this witness for cross.

23 MS. CREMER: Thank you.

24 Crowned Ridge.

25 MR. SCHUMACHER: Applicant has no questions for

1 this witness. Thank you.

2 MS. CREMER: Thank you.

3 Intervenors.

4 MR. GANJE: Thank you.

5 CROSS-EXAMINATION

6 BY MR. GANJE:

7 Q. Good afternoon, Ms. Olson.

8 A. Good afternoon.

9 Q. I'm David Ganje on behalf of the Intervenors. Only
10 a few questions, but I would ask you to kindly look at
11 Exhibit A1-B, page 71.

12 A. 71?

13 Q. Please. Exhibit A1-B. I believe it would be page
14 71.

15 A. Okay. It's a map?

16 Q. Yes, indeed. If you'd kindly take a moment to look
17 at the map, I'll ask a question or two.

18 A. Okay.

19 Q. Is this the map that you used as the basis of your
20 report and work on this project?

21 A. That's a good question. You know, I am not sure.
22 Unless I looked at the survey report, I can't confirm
23 whether this is the exact same footprint or not.

24 Q. Would you be kind enough to look at the survey
25 report?

1 A. Yes. Absolutely.

2 Where is it?

3 Q. Well --

4 MS. CHRISTENSON: We've never received one.

5 A. Well, I do not have them with me so -- but I would
6 assume if this is the same footprint as when I reviewed
7 the cultural resource reports, then it's the same.

8 Q. Okay. Maybe I can get you there. I'll try to get
9 you there.

10 A. Sure.

11 Q. If you'll be kind enough to look at Exhibit A1-B,
12 page 68.

13 A. It's an e-mail.

14 Q. Right.

15 A. Okay.

16 Q. And that e-mail was directed to you on June 16 of
17 2017?

18 A. Yes.

19 Q. And that e-mail refers to a document attached; is
20 that correct?

21 A. Uh-huh. Yes.

22 Q. And then following that is a memorandum at page 69
23 dated June 14, 2017?

24 A. Yes.

25 Q. And following that is a continuation of the

1 memorandum on page 70?

2 A. Yes.

3 Q. And then the next page thereafter is the map on 71?

4 A. Yes.

5 Q. Okay. So I -- my question to you is is that --
6 based on this other information, is that the map that you
7 used for the purposes of your work and report on this
8 project?

9 A. Yes.

10 Q. Okay.

11 MR. GANJE: May I approach the witness?

12 MS. CREMER: Yes.

13 Q. I'll show you Exhibit A1-E, page 2. You may not
14 have it easily accessible, but for the record I'm just
15 putting it in the record so that people will know the map
16 I'm going to hand you to ask you a couple of questions.
17 Okay?

18 (Counsel approaches the witness.)

19 Q. When I refer to the Exhibit A1-E, page 2, it has a
20 yellow parameter border area for the project showing a
21 large portion of the project within the yellow border
22 area in the northeast portion of that map.

23 The map again is A1-E, page 2.

24 I would ask you kindly to look at the map we started
25 to talk about, which is A1-B, page 71.

1 A. I'm sorry. Can you repeat that.

2 Q. Yes. I would ask you to please look at the first
3 map we talked about, which is A1-B, page 71.

4 A. Yes.

5 Q. Are you able to look at both maps now?

6 A. Yes, I am.

7 Q. Thank you. Thank you.

8 So my question is there is an area in the
9 northeastern portion of the proposed project. As you can
10 see, it provides a different delineation of the project
11 area than is found on --

12 The area on Exhibit A1-E, page 2 is an area in the
13 northeastern portion of the project which shows an area
14 within the project parameter, within the project
15 boundary, that is different than the project parameter or
16 project boundary found on Exhibit A1-B, page 71.

17 Would you agree?

18 A. Yes.

19 Q. Okay. So then my question is did your study include
20 this northeastern area which is found on Exhibit A1-E,
21 page 2 but not found on Exhibit A1-B, page 71?

22 A. So I didn't actually do the study. My role is to
23 review the information provided by the consultants. And
24 so I am assuming that this part and I -- I'm not sure,
25 but I think the part that's in Grant County in that

1 northeastern part is the second Crowned Ridge project.

2 No, it's not? Then I assume it's another wind farm
3 project, but I'm not sure. I'd have to look at my
4 records.

5 Q. But as things sit now with your knowledge of the
6 work that you did with the Applicant and the Applicant's
7 consultant, which was SWCA?

8 A. Uh-huh.

9 Q. The area that you studied was that which is found in
10 Exhibit A1-B, page 71?

11 A. To best of my knowledge, it is, yes.

12 MR. GANJE: No further questions.

13 MS. CREMER: Thank you. That would take us to
14 Commission questions.

15 Commissioner Nelson.

16 COMMISSIONER NELSON: You've cleared up the only
17 questions I had prepared so thank you.

18 THE WITNESS: You're welcome.

19 MS. CREMER: Commissioner Fiegen.

20 COMMISSIONER FIEGEN: I just have one quick
21 question, and it's about the four tribes, you know, the
22 Native American cultural studies that have been done in
23 the meetings.

24 Were you part of any of those meetings?

25 THE WITNESS: I was not.

1 COMMISSIONER FIEGEN: Okay. You've seen a lot
2 of wind docket in the past year and a half, maybe two
3 years. Is this the first time that you've seen that many
4 tribes come together and really look at a more in-depth
5 study?

6 THE WITNESS: It's not the first time, no.

7 COMMISSIONER FIEGEN: All right. Thank you.

8 CHAIRMAN HANSON: Good afternoon, Ms. Olson, and
9 welcome back.

10 THE WITNESS: Thank you.

11 CHAIRMAN HANSON: I hope we don't do this lots
12 and lots more times. Probably you do too.

13 You said that they have completed a Level III
14 for several different portions of the project in your
15 testimony just now. Are they going to complete, to the
16 best of your knowledge, for the entire project?

17 THE WITNESS: Yes.

18 CHAIRMAN HANSON: Are they making a valiant
19 effort towards that, as far as you know?

20 THE WITNESS: Yes, they are.

21 CHAIRMAN HANSON: Are you old enough to have
22 ever watched the Art Linkletter show?

23 THE WITNESS: I am not.

24 CHAIRMAN HANSON: Art Linkletter used to bring
25 people on -- well, kids and have them on, a bunch of

1 them, about maybe 15, 20 of them, and he'd ask them
2 questions and they gave hilarious questions. One of the
3 first questions he would ask -- of course, little kids
4 going on know all of these things about their families,
5 and their parents are always telling them don't say this,
6 don't say that, don't say that.

7 I'm always tempted to say what did your bosses
8 tell you not to say while you were testifying. But I'll
9 skip that part for now.

10 THE WITNESS: Thank you.

11 CHAIRMAN HANSON: Thank you for testifying.

12 MS. CREMER: Redirect.

13 REDIRECT EXAMINATION

14 BY MS. EDWARDS:

15 Q. Throughout the pendency of this process and
16 potential construction are you sort of kept in the loop
17 and updated when changes are made if that occurs during
18 construction? That was probably not a very good
19 question.

20 A. No. It depends. If they're changing or doing
21 reroutes and they're doing more survey, then I'm kept in
22 the loop on the additional survey. So, yes, they provide
23 additional information every time they change -- I assume
24 that they'll change the routes because that's what
25 they've done in the -- that's -- I believe that's what

1 they'll do. I don't have any concerns with it.

2 MS. EDWARDS: No further questions. Thank you.

3 MS. CREMER: Recross?

4 MR. SCHUMACHER: Thank you.

5 RECROSS-EXAMINATION

6 BY MR. SCHUMACHER:

7 Q. Ms. Olson, is it possible that Crowned Ridge could
8 have provided you with supplemental information that
9 covers the studies for that northeast area that we've
10 been talking about?

11 A. You know, it potentially -- I have so many wind
12 farms going on now that I apologize, but unless I have
13 the specific project in front of me -- I can look it up
14 when I get back to the office, but I cannot specifically
15 tell you at this point.

16 Q. And is going back and checking your records for any
17 information that would indicate that you had been
18 provided with studies pertinent to that area -- would you
19 be willing to do that?

20 A. Absolutely.

21 MR. SCHUMACHER: Okay. Thank you.

22 THE WITNESS: Yeah.

23 MS. CREMER: Intervenors.

24 MR. GANJE: No further questions.

25 MS. CREMER: Thank you.

1 Staff, final redirect?

2 MS. EDWARDS: None.

3 MS. CREMER: Thank you, Ms. Olson. You may step
4 down.

5 THE WITNESS: Thank you.

6 (The witness is excused.)

7 MS. CREMER: Staff, you can call your next
8 witness.

9 MS. EDWARDS: Staff calls Darren Kearney.

10 (The oath is administered by the court reporter.)

11 DIRECT EXAMINATION

12 BY MS. EDWARDS:

13 Q. Mr. Kearney, please state your name for the record.

14 A. Darren Kearney.

15 Q. Where do you work?

16 A. Public Utilities Commission.

17 Q. What is your job title there?

18 A. Utility analyst.

19 Q. Can you briefly explain what your job duties are as
20 they relate to this proceeding?

21 A. Part of the team of staff that reviews wind farm
22 applications for siting permits, as well as transmission
23 lines and pipelines as it relates to siting, as well as
24 other energy conversion facilities.

25 Q. Did you submit prefiled testimony in this docket?

1 A. I did.

2 Q. And, for the record, that has been stipulated to
3 and, therefore, previously admitted as Staff Exhibit S2.

4 Do you have that in front of you?

5 A. In pieces, yes.

6 Q. I think it's been used a few times.

7 At the time you wrote the prefiled testimony was it
8 true and accurate to the best of your knowledge?

9 A. It was.

10 Q. Do you have any updates to make at this time?

11 A. In my testimony I had a little bit of a lengthy
12 section about the cumulative impacts as it relates to a
13 couple of projects in the region. In my opinion, Crowned
14 Ridge addressed that concern through the Rebuttal
15 Testimony, and so those sections would be essentially
16 removed from my testimony at this point in time, given
17 that they addressed my concern.

18 Q. Are you generally familiar with the requirements of
19 Grant and Codington Counties for decommissioning of this
20 project?

21 A. Yes.

22 Q. Is it your position that the decommissioning
23 requirements of those counties are sufficient by
24 themselves?

25 A. I have some concerns if the Commission would, I

1 guess, defer to the counties on decommissioning.

2 Codington County simply has a financial assurance
3 requirement. We don't know what that will look like.
4 Grant County has a financial assurance requirement, and
5 in one of the criteria they can require the company to
6 have an escrow account with certain criteria attached to
7 it, similar to probably the Crocker decision that the
8 Commission had ordered here.

9 My concern is that if you have wind turbines in
10 multiple counties, that could potentially be two
11 different decommissioning criteria that the company would
12 need to do in order to fund or protect against the
13 decommissioning of the wind turbines.

14 As stated in my testimony, I think it would be more
15 efficient if the State were to have a decommissioning
16 standard that meets the Commission's satisfaction, and
17 the counties could then adopt that if they see fit.

18 And the main driver for that is with the recent
19 legislation, Senate Bill 16, there's some added
20 protection that the legislature has now put on
21 decommissioning of wind farms through law that, based on
22 my lawyer's guidance, would only protect against the
23 decommissioning if this Commission were to order it.
24 Then that law would apply based upon the way the language
25 is written.

1 And so that's the basis for our recommendation that
2 this Commission should look at considering the right of
3 decommissioning for this project.

4 MS. EDWARDS: At this time I would ask that the
5 Commission take judicial or administrative notice of
6 Senate Bill 16, which I have passed out for everybody. I
7 request that pursuant to SDCL 1-26-19 Sub 3.

8 MS. CREMER: Crowned Ridge, do you have a
9 comment, objection to the --

10 MR. MURPHY: I have no objection to taking
11 judicial notice of the law.

12 MR. GANJE: No objection.

13 MS. CREMER: The Commission will take judicial
14 notice of that. Thank you.

15 A. Could I add a little bit more on decommissioning?

16 Q. Please do.

17 A. The Applicant has agreed to do an escrow account so
18 that's not the issue here. They're willing to fund
19 \$5,000 per turbine per year consistent with other wind
20 projects.

21 And during our talks regarding proposed
22 decommissioning conditions they agreed with pretty much
23 everything the Commission has done within the past, but
24 they wanted to add a new criteria where it kind of would
25 allow the County's escrow account to satisfy the

1 Commission's.

2 And Staff wasn't comfortable with accepting that
3 specific language in the condition, given the Senate
4 Bill 16 that was recently passed. And that's why there's
5 not a decommissioning condition that both the Applicant
6 and Staff agreed to and it's left out of Exhibit A61.

7 Q. Thank you.

8 In the processing of this docket did you submit any
9 Data Requests to any of the other parties?

10 A. Yes, I did.

11 Q. And are those S5 and S6, which have previously been
12 stipulated into the record?

13 A. Yes. S5, S6, and also included as attachments in
14 S2.

15 Q. Thank you for that correction.

16 Moving on to Exhibit S7, also previously stipulated
17 into the record, are you familiar with that exhibit?

18 A. That's the Staff's proposed lek monitoring
19 condition; correct?

20 Q. Correct.

21 A. Yes. I'm familiar with it.

22 Q. Did you help draft that?

23 A. I drafted it, yes.

24 Q. Do you have any corrections you would like to make
25 to that?

1 A. The only correction I would like to make to it is in
2 the first sentence. This draft came during settlement
3 talks or talks with the company over proposed conditions,
4 and ultimately they didn't agree to it. And I failed to
5 update the first sentence where it says, "Applicant
6 agrees to undertake a minimum of two years."

7 And given that they didn't agree to it, Staff would
8 propose that the language be changed to "Applicant shall
9 undertake a minimum of two years," should the Commission
10 find that this condition is reasonable and prudent based
11 on the evidence presented to you in this hearing.

12 MS. EDWARDS: Thank you, Mr. Kearney.

13 I have no further questions for this witness and
14 would tender him for cross.

15 MS. CREMER: Thank you.

16 Crowned Ridge.

17 MR. MURPHY: Thank you. No initial questions.

18 MS. CREMER: Thank you.

19 Intervenor.

20 CROSS-EXAMINATION

21 BY MR. GANJE:

22 Q. Thank you. Mr. Kearney, we've met. I'm Dave Ganje,
23 and I represent the Intervenor in this matter.

24 I understand you've had a decent amount of
25 settlement talks as you described them with the Applicant

1 working through potential conditions for a permit; is
2 that right?

3 A. That's correct. And I identified in my prefiled
4 testimony that we would be doing so and -- and filing
5 draft permit conditions, proposed permit conditions, at
6 the hearing for the Commission to review.

7 So it was in my prefiled testimony that we would be
8 having those talks.

9 Q. My question then, the first question is have you --
10 because you were the lead person more or less for the
11 Staff on the real work on the conditions; isn't that
12 true?

13 A. Yes.

14 Q. I thought so. I'm pretty impressed with your
15 abilities. I will compliment you, sir.

16 But I will ask you whether you included or consulted
17 the Intervenors in the discussions you had with the
18 Applicant regarding working out the terms of possible
19 conditions for a permit?

20 A. We did not. And I tried to give the Intervenors an
21 opportunity to provide justification for any conditions
22 that they would like to see attached to a permit through
23 my Prefiled Direct Testimony. I think it's table
24 Exhibit DK-8 in Exhibit S2.

25 And there I kind of went through and said, okay, we

1 looked at all these proposed recommended conditions that
2 we got through the Intervenor discovery, and I said we
3 could agree, disagree, or maybe, depending upon further
4 information.

5 Q. Yes.

6 A. So you had the opportunity to say, okay, well,
7 Staff's not agreeing with these, unless there's more
8 information filed as evidence. And so we were kind of
9 just saying, okay, well, here's our initial position.
10 Submit evidence to us through this process, and then we
11 can reconsider it and update our testimony if needed. So
12 that's kind of how we were seeing that play out.

13 We did not see any evidence come in that would
14 cause us to reconsider our initial proposed position on
15 those.

16 Q. Over the last several days you and the Staff have
17 spent considerable time working with the Applicant on a
18 series of probably important conditions that you're
19 recommending to the Commission for the purposes of any
20 approved permit; is that correct?

21 A. That's correct.

22 Q. Right. So that's serious stuff.

23 Did you, during any of this recent communication
24 with the Applicants, reach out to me or to my clients to
25 bring us into the loop in discussing those conditions so

1 that our input might be considered at this stage of the
2 process?

3 A. Personally, I did not reach out to you. I cannot
4 say whether or not Staff's counsel reached out to you or
5 not. But I am not aware of that.

6 Q. Uh-huh. My next question would be is there a rule
7 with which I am not familiar -- but there very well could
8 be, but is there a rule that prohibits you from
9 communicating with Intervenors?

10 MS. EDWARDS: Objection. Calls for a legal
11 conclusion.

12 MR. GANJE: I'll ask it a different way.

13 Q. Is there something within the framework of your job
14 that prohibits you from communicating with Intervenors
15 concerning working out conditions of the potential permit
16 with an Applicant?

17 A. Not --

18 MS. EDWARDS: Objection. That was asked and
19 answered. He said he reached out to them in Exhibit DK-8
20 attached to his testimony. Also it's argumentative.

21 MR. GANJE: I don't think it is, ma'am. I'm
22 just trying to find out why the process is working this
23 way. And I do think it's a fair, relevant question.

24 MS. CREMER: I'm going to overrule, and you may
25 answer.

1 THE WITNESS: Can you read back the question,
2 please.

3 MR. GANJE: I would ask the honorable court
4 reporter if she would do me the favor of reading back the
5 question, please.

6 (Reporter reads back the last question.)

7 A. There is nothing that prevents us from reaching out
8 to the Intervenor and we do so through the formal
9 discovery process and through testimony and that's how we
10 try to identify what issues the Intervenor may have or
11 what concerns they may have with the project.

12 Q. You use that formal discovery process also on the
13 Applicant; right?

14 A. That's correct.

15 Q. But, nevertheless, over the last several days or
16 weeks you have been in informal negotiations with them
17 not through a formal discovery process; is that correct?

18 A. That's correct, based on Staff's position on the
19 issues in this matter.

20 Q. Okay. Wouldn't it be, in your opinion, helpful to
21 moving this process along if you brought into the
22 dialogue or into the loop Intervenor who were serious
23 about this project and working with you on it?

24 A. And "this process" you're referring to --

25 Q. Is called wind farm siting process.

1 A. I would just state that this whole process the
2 Intervenors have an opportunity to participate in through
3 the evidentiary process.

4 Q. So apparently at the end of the evidentiary process
5 communication continues with the Applicant but not with a
6 good-faith Intervenor willing to communicate with you.

7 A. The evidentiary process has not ended yet, to the
8 best of my knowledge. We're still part of it.

9 Q. I see. Well, anyway, I think you've pretty much
10 answered my question, and the record reflects what took
11 place here. And I have no further questions.

12 MS. CREMER: Thank you.

13 Commissioner Fiegen.

14 COMMISSIONER FIEGEN: Thank you, Mr. Kearney,
15 for being here today. I finally get to ask you questions
16 because you know I can't just walk into your office and
17 ask you questions.

18 So a couple questions on the lek survey and just
19 the lek condition and all of those issues.

20 It sounds like Game, Fish & Parks really
21 recommended that for a known lek that the wind turbines
22 are constructed -- is it at least a mile away?

23 THE WITNESS: That would be my understanding of
24 their recommendation.

25 COMMISSIONER FIEGEN: Okay. And then you're

1 going to have to help me with these surveys and the
2 condition. Because even the condition you've heard
3 that -- it appears to me as a Commissioner that is a
4 layperson, certainly on surveys, it appears to me that
5 Crowned Ridge may not have done its due diligence on lek
6 surveys. Maybe a prior owner back in previous years may
7 have, but they may not have.

8 And so the condition looks at what Game, Fish &
9 Parks has done, it looks like, and they state a lot of
10 times they get it from the general public or -- and then
11 it has Crowned Ridge Wildlife Survey, which may have
12 nothing to do, it sounds like, as a layperson trying to
13 analyze this finding lek areas.

14 So what are we going to do with the two-year
15 survey, and do you think it's a comprehensive survey that
16 is really going to look at lek areas in that area or
17 maybe just some Game, Fish & Parks areas that were
18 publicly given from the public to them?

19 THE WITNESS: What I can say is I drafted this
20 language for the Commission to consider based on the
21 recommendation from the GF&P.

22 As Mr. Kirschenmann has testified to, it's known
23 leks or leks the Applicant had -- or Crowned Ridge knows
24 of within one mile of a turbine that they would complete
25 the leks monitoring on postconstruction.

1 It's not calling for a full blown survey of the
2 whole entire project area because the GF&P is wanting the
3 data on those that are located within one mile of the
4 leks that are located within one mile of a turbine.

5 Does that answer your question, or did I
6 misunderstand?

7 COMMISSIONER FIEGEN: No. I mean, I think it
8 answers my question as good as I could clarify it.
9 Because I'm still trying to put all of these pieces
10 together and see what the end product will look like
11 July 30 or whenever we have to sign our -- well, I guess
12 we need to decide on it before that.

13 The other question about it is decommissioning
14 and -- so is it your understanding NextEra is going to
15 own this and Xcel Energy is only a PPA and will not own
16 the project?

17 Is that your understanding?

18 THE WITNESS: Xcel's buying the energy from
19 Crowned Ridge, LLC, which is an affiliate of NextEra. So
20 yeah. Crowned Ridge will own the project.

21 COMMISSIONER FIEGEN: Sure.

22 So you certainly remember the testimony that we
23 had on Senate Bill 16 and the IOUs when they would own a
24 project it would be different. So we're certainly
25 looking at the decommissioning and how important that

1 is.

2 THE WITNESS: And we did take that in past when
3 an IOU has ended up doing a -- what is it -- purchase,
4 bill, transfer, buy, whatever they call it, we took that
5 language out of this condition specifically because an
6 IOU wasn't going to own it. They're just procuring
7 energy through a PPA.

8 COMMISSIONER FIEGEN: So I'm not going to ask
9 you a legal conclusion because I can't, but do you think
10 there's a way that Staff could possibly work with County
11 Commissioners to get a waiver on their ordinance or --

12 I mean, because we want to make sure that our
13 residents are protected. So that's our goal. And when
14 you look at Senate Bill 16 we need to make sure they're
15 protected.

16 So although there's ordinances out there of
17 counties, what can the Commission do to ensure we're not
18 being double commissioned, I guess, but --

19 THE WITNESS: That's a good question.

20 COMMISSIONER FIEGEN: -- our people are
21 protected.

22 THE WITNESS: And that's what Staff's wrestling
23 with.

24 Ideally there would be one escrow account
25 agreement set up, which Staff would prefer under this

1 condition, and then the counties say, yep, that meets our
2 financial assurance requirements and, therefore, the
3 developer doesn't need to do anything else.

4 I don't know what the process would be for
5 reaching out to the counties to get them to sign off on
6 what the Commission does for a decommissioning condition,
7 but I know that Crowned Ridge has been in talks with
8 Grant County and Codrington County about what
9 decommissioning they would like to see. So perhaps they
10 could provide more color on the proper process.

11 But at this point in time Staff's just
12 considering this permit from the State perspective.

13 COMMISSIONER FIEGEN: Thank you. And I guess I
14 kind of just wanted to have a conversation with you
15 because I can't walk into your office. And the
16 Commissioners are going to have to make a decision
17 whenever Ms. Cremer decides to put it on the agenda,
18 which will be, you know, within the next month.

19 So I just want to make sure you know how I'm
20 thinking right now because I won't be able to tell you,
21 only at a public hearing.

22 So thank you.

23 THE WITNESS: And can I clarify? Right now the
24 way it was kind of going was that the counties would have
25 the decommissioning requirement, and the Commission would

1 kind of waive their decommissioning -- their
2 decommissioning requirement because you just defer to the
3 counties kind of. And Staff wasn't comfortable with this
4 based on the Commission's past decisions in recent
5 dockets.

6 COMMISSIONER FIEGEN: Thank you for sticking up
7 for us.

8 That's it, Chairman. The mic. is yours.

9 CHAIRMAN HANSON: Thank you, Commissioner.
10 Have you ever watched the Art Linkletter show?

11 THE WITNESS: I did not catch that. It must
12 have been humorous.

13 COMMISSIONER FIEGEN: You have to look at Greg.

14 CHAIRMAN HANSON: Are all of Staff's concerns
15 satisfied at this moment other than those that you've
16 iterated?

17 THE WITNESS: Yes, they are, except the
18 decommissioning and then the lek monitoring condition
19 that Staff has the proposed language out there for.

20 CHAIRMAN HANSON: Thank you.

21 Does the Intervenor have the opportunity to
22 contact the Applicant and discuss and negotiate their
23 issues?

24 THE WITNESS: Yes.

25 CHAIRMAN HANSON: As far as you're aware.

1 THE WITNESS: I believe they would, as a party
2 to the proceeding, be able to reach out to either Staff
3 or the Applicant to talk about their issues and concerns.

4 CHAIRMAN HANSON: Has that taken place in this
5 or other dockets, as far as you're aware? Do they send
6 information back and forth and ask questions?

7 THE WITNESS: They do reach out to us and
8 communicate with us. Some will call us and ask questions
9 about the process or Staff's review of the material -- I
10 guess it happens where it's just more informal
11 communications that they reach out to us through -- in
12 addition to the formal evidentiary process.

13 CHAIRMAN HANSON: I ordinarily wouldn't ask
14 you -- excuse me.

15 I ordinarily wouldn't ask you these questions
16 because it sounds more like a redirect, but since you're
17 Staff with the Public Utilities Commission, I feel
18 compelled to pursue.

19 Do Intervenors occasionally contact the
20 Applicant and have discussions with them without having
21 discussions with you? Are you aware of them? I mean, if
22 they have those discussions, you wouldn't always be
23 notified.

24 THE WITNESS: I'm not aware of those
25 discussions. I wouldn't be aware of them. So I'm not

1 saying they do occur or they don't occur. I'm just not
2 in the loop on those if they do occur.

3 CHAIRMAN HANSON: However, to the best of your
4 knowledge, they do have that opportunity.

5 THE WITNESS: Yes, they do.

6 CHAIRMAN HANSON: Are all of your issues and
7 Intervenors' issues identical?

8 THE WITNESS: No.

9 CHAIRMAN HANSON: Did you explore the issues
10 that the Intervenors have proposed?

11 THE WITNESS: We looked into them and have tried
12 to -- I did include our initial position on them in my
13 Prefiled Direct Testimony so they could respond if they
14 disagree with Staff's position and provide us more for
15 support or justification for why that recommendation was
16 being made.

17 CHAIRMAN HANSON: Yes. Your testimony does show
18 that.

19 Do you negotiate on behalf -- and perhaps
20 negotiate is the wrong word. Where do your interests lie
21 and your pursuits lie as you go through this process? Do
22 you -- do you work for the Commissioners? Do you work
23 for the citizens of South Dakota? For the State? Where
24 do you see -- what's your direction?

25 THE WITNESS: I don't view it's Staff's position

1 to represent the Intervenor's interests in these matters.
2 We're representing the public interests of the whole
3 population in South Dakota. Therefore, we're reviewing
4 minimizing impacts to everyone to the extent practical
5 and making sure that any proposed development is
6 consistent with the laws and rules that the Commission
7 has in place and laws that are in place that give this
8 Commission the direction and authority to site these
9 projects.

10 (Discussion off the record.)

11 CHAIRMAN HANSON: The Applicant has stated and
12 Commissioner Fiegen gave her -- expressed some concerns.
13 Once the counties --

14 The Applicant desires that the Counties'
15 decommissioning requests supersede the State's. And give
16 you -- my personal opinion is that the Counties' will not
17 supplant the State's requirement for decommissioning.
18 That's my position.

19 That's all the questions I have.

20 COMMISSIONER NELSON: Well, I like Chairman
21 Hanson's position, but I'm going to have to ask some
22 deeper questions to get at where we're really at with
23 that.

24 So help me understand if we establish a
25 condition regarding an escrow account as we have in a

1 number of dockets, why would that not comply with the
2 Grant County requirement?

3 THE WITNESS: I would suspect that it would, and
4 that's why Staff wasn't comfortable with the language
5 that the Applicant proposed and the condition that we
6 ended up pulling at the last minute.

7 I don't know why it wouldn't comply with the
8 Grant County -- all the criteria set forth in their
9 ordinance for an escrow account would be met, as well as
10 additional language that has evolved over time through
11 the discussion of wind project decommissioning before
12 this Commission.

13 COMMISSIONER NELSON: In your discussions with
14 the Applicant, have they relayed to you any reasons why
15 they believe our escrow methodology would not comply with
16 the Grant County requirement?

17 THE WITNESS: Not that I recall.

18 COMMISSIONER NELSON: Well, in that case, I
19 think we can follow Chairman Hanson's lead. I'm good
20 with that.

21 No further questions.

22 MS. CREMER: Thank you.

23 Any redirect?

24 MS. EDWARDS: Can we take a five-minute break so
25 I can go through all my notes?

1 MS. CREMER: Yes.

2 MS. EDWARDS: Thank you.

3 (A short recess is taken.)

4 MS. CREMER: We'll go back on the record.

5 Staff.

6 MS. EDWARDS: Thank you. I just have a very
7 brief redirect.

8 REDIRECT EXAMINATION

9 BY MS. EDWARDS:

10 Q. Are you involved in other wind siting dockets at
11 this Commission?

12 A. I am, yes.

13 Q. And there were a number of questions about sitting
14 down with the Intervenor and Applicant. Are you aware,
15 in fact, in another docket did Staff sit down with the
16 Intervenor and the Applicant upon the Intervenor
17 requesting interest?

18 A. Yes. Staff drove to Miller to meet with the
19 Intervenor and Applicant to try to address the concerns
20 and see if there would be a way to work out her concerns.

21 Q. Do you know, was this at the Intervenor's request?

22 A. I believe it was, yes.

23 Q. Okay. In these wind siting dockets is it your
24 practice to send out a Data Request to Intervenors to
25 gauge their concerns?

1 A. Yes. So we have an idea of what their concerns are,
2 we do send out a discovery request, and one of those
3 includes what are your concerns with the project.
4 Another one is please provide any recommended permit
5 conditions that you would think is necessary for the
6 project.

7 Q. Did you do that in this docket?

8 A. We did, yes.

9 Q. Did you receive a response?

10 A. Yes. We received a response.

11 Q. Is that filed with your testimony?

12 A. Yes. It's part of S2.

13 Q. Is that S2 Exhibit DK-8 in your testimony?

14 A. DK-8 is the table that I made of their proposed
15 recommended permit conditions. Their discovery request
16 is in there, and I believe it's S3 -- or DK-3.

17 Q. Based upon that discovery request response, did you
18 have an impression of -- strike that.

19 What was your assessment of a likelihood of a global
20 settlement in this docket?

21 A. Given that there was no additional justification
22 presented to Staff or submitted through testimony, Staff
23 felt that there was a very low likelihood of reaching a
24 global settlement on those issues.

25 MS. EDWARDS: Thank you. I have no further

1 questions.

2 MS. CREMER: Thank you.

3 Crowned Ridge, do you have any recross?

4 MR. MURPHY: No. Thank you.

5 MS. CREMER: Thank you.

6 Intervenors.

7 MR. GANJE: None.

8 MS. CREMER: Thank you.

9 There would be no final redirect in that case.
10 You may step down, Mr. Kearney.

11 (The witness is excused.)

12 MS. CREMER: Please call your next witness.

13 MS. EDWARDS: Staff rests.

14 MS. CREMER: We thought Mr. Paulson was to be
15 called.

16 MS. EDWARDS: Staff calls Eric Paulson.

17 MS. CREMER: Okay. Maybe not.

18 CHAIRMAN HANSON: It's easy not to spot him.

19 MS. CREMER: So, Crowned Ridge, are you prepared
20 to do rebuttal? Do you have rebuttal?

21 MR. MURPHY: We do not have rebuttal. If you'd
22 like, I could go through the Data Requests that have been
23 supplied to make sure the Commission's aware of what we
24 supplied and what's outstanding.

25 And I also believe that the Commission wanted to

1 recall one of our witnesses to talk about shadow flicker,
2 and we've provided that table.

3 But other than that, I think that's all that we
4 would have outstanding.

5 MS. CREMER: Okay. And I will have you go
6 through that in a moment. And so I'm just going to
7 remind all the parties that if you have exhibits that you
8 believe have been offered and admitted, you should
9 confirm that with your notes because we will be closing
10 out the evidentiary hearing shortly.

11 So please proceed then.

12 MR. MURPHY: Thank you. I have a number of Data
13 Requests I'll just go through and make sure that we're on
14 the same page with other requests or Data Requests.

15 The optional agreements were filed this morning
16 as confidential documents. The five FAA pending turbine
17 were filed this morning. The insurance types and limits
18 were filed this afternoon as a confidential document.
19 The coldest temperature that turbines can operate with
20 the extreme cold weather package was filed. And this
21 afternoon the shadow flicker tables were also filed and
22 distributed.

23 Mr. Haley is available to receive questions on
24 those.

25 As far as outstanding exhibits that I want to

1 make sure were moved into the record, I have A52, A53,
2 and A54 that my recollection is not serving me that those
3 were moved into the record, and we would like those
4 moved -- we would move for those to be into the record at
5 the appropriate time.

6 MS. EDWARDS: No objection.

7 MS. CREMER: Intervenors. And you said, to make
8 sure, 52, 53, 54?

9 MR. MURPHY: Correct.

10 MS. CREMER: All right. Thank you.

11 MR. GANJE: Counsel, are 53 and 54, have they
12 previously been provided, or is there a more recent map
13 that was submitted?

14 MR. MURPHY: 54 is the final map that
15 Mr. Wilhelm walked through with the additions of the
16 stickies, which were removed after we walked through it.

17 MR. GANJE: Okay. That's 53 or 54?

18 MR. MURPHY: They're one in the same, except
19 that 54 included some turbines that were missing during
20 the printing of 53. They're essentially the same for
21 some dots that were inadvertently not on the original
22 map. Same final status of land, some array, same
23 collection.

24 MR. GANJE: And that A54 was submitted
25 yesterday; is that correct?

1 MR. MURPHY: My days are running together for
2 me. I thought it was Monday.

3 MS. CREMER: Yeah.

4 MR. GANJE: It was Monday. Okay. It was
5 submitted prehearing, in other words.

6 MR. MURPHY: Correct.

7 MR. GANJE: No objection.

8 MS. CREMER: Thank you.

9 And then, Mr. Murphy, those ones that you
10 mentioned the options, the insurance, do those have
11 exhibit numbers, and are you offering those?

12 MR. MURPHY: Thank you. They do, and I'll
13 let -- Miles, if you can read them off.

14 MR. SCHUMACHER: Yes. I can provide the exhibit
15 numbers for those that were filed today.

16 Exhibit A62 and A63 are -- 62 is the FAA pending
17 turbine locations. A63 is the Amended Condition 26 with
18 regard to sound level.

19 Exhibit A64 and 65 are the two confidential
20 landowner agreements. Exhibit 66 is a letter from me
21 that includes information about the extreme cold weather
22 package that is going to be installed on the turbines.

23 Exhibit 67 and 68 are the updated shadow
24 results. 67 is Appendix C-1 updated, and Exhibit A68 is
25 Appendix C-2 as updated. And, finally, Exhibit 69 is the

1 confidential exhibit including the project insurance
2 information.

3 MR. GANJE: If I may, Madam Examiner.

4 MS. CREMER: Uh-huh.

5 MR. GANJE: One that you didn't identify,
6 counsel, was the five FAA pending turbines. That was a
7 document, but you didn't indicate that with an exhibit
8 number. That was my first concern.

9 MR. SCHUMACHER: I'm sorry. Would you please
10 repeat that?

11 MR. GANJE: Yes. Your colleague mentioned that
12 you were submitting a document identifying five FAA
13 pending turbines or turbine concerns. What exhibit
14 number is that?

15 MR. SCHUMACHER: That was A62.

16 MR. GANJE: And that -- I know with regard to
17 the land agreements your colleague mentioned that he was
18 claiming that as confidential, but the five FAA pending
19 turbine question or document, that isn't confidential.

20 MR. SCHUMACHER: That is not confidential. 62
21 is not confidential. You were served with that.

22 MR. GANJE: When was I served with that one,
23 counsel?

24 MR. SCHUMACHER: Today.

25 MR. GANJE: I was. By electronic?

1 MR. SCHUMACHER: Yes.

2 MR. GANJE: Then at some point I'll be able to
3 see on a map where those five are located?

4 MR. SCHUMACHER: I don't know whether it's a map
5 or just the turbine numbers.

6 MR. GANJE: Sure. That will get me to a map
7 eventually.

8 MR. SCHUMACHER: Yep.

9 MR. GANJE: Thank you.

10 MS. CREMER: Did you have any objection to
11 those?

12 MR. GANJE: No.

13 MS. CREMER: All right. Staff.

14 MS. EDWARDS: The only one I have a concern with
15 is Exhibit A69. It's the insurance coverage. I just
16 have sort of a foundational concern just because I don't
17 know where this came from or who has the knowledge of
18 this since all the witnesses testified they didn't have
19 any knowledge of it.

20 Could you just say what witness this would be
21 tied to, who made it, where did it come from?

22 MR. MURPHY: It came from Sam Massey, and he
23 worked with our insurance experts in the company.

24 MS. EDWARDS: No objection.

25 MS. CREMER: All right. With that, 52, 53, 54,

1 62, 63, 64, 65, 66, 67, 68, and 69 are admitted.

2 MR. SCHUMACHER: And, finally, we're not certain
3 whether or not A6-1, which is the joint stipulation of
4 agreed conditions between Crowned Ridge and PUC Staff,
5 has been offered.

6 MS. EDWARDS: To my knowledge that was never
7 offered.

8 MS. CREMER: I don't have it marked.

9 MR. SCHUMACHER: Okay. We do have that marked
10 as Exhibit A61 and would offer that.

11 MS. CREMER: Intervenors.

12 MR. GANJE: Well, I wasn't involved in any of
13 these negotiations. I object. I have no grounds to
14 understand -- I've seen it for the first time but I was
15 not involved in it and I can't say whether this is right
16 or fair or relevant or material or it concedes something
17 that will be a prejudice to my clients and that concerns
18 me greatly.

19 That's why I was disappointed not to be involved
20 in the last series of negotiations that took place with
21 the PUC Staff and the Applicant. I would have made
22 myself available had I even known they occurred. I found
23 out about them only this week. So I object to the
24 introduction of the stipulation or proposed permit
25 conditions on those grounds.

1 MS. CREMER: Thank you. It will be noted.

2 Staff.

3 MS. EDWARDS: I guess I'm not sure whether that
4 was a foundational objection or what, but I have no
5 objection.

6 MS. CREMER: Thank you. It will be admitted.

7 Commissioners, did you want to recall Mr. Haley
8 to discuss the exhibits that were filed?

9 COMMISSIONER FIEGEN: And I do not. I looked at
10 it. The 136 participating one is on there. Otherwise,
11 everybody else is below. So I do not need to call him.

12 CHAIRMAN HANSON: As much as I enjoy Mr. Haley's
13 company, no.

14 MS. CREMER: Thank you.

15 Does anyone have anything further?

16 COMMISSIONER FIEGEN: Yes. I do have an
17 outstanding one that Mr. Murphy, I bet you -- he had the
18 mic. ready to go. So the outstanding one of the 19
19 native grasses that was in the original map that you'll
20 supply --

21 MR. MURPHY: I would think we could supply that
22 tomorrow or the next day at the very latest.

23 MS. CREMER: All right. So that will be a
24 late-filed exhibit, and that would be A what?

25 MR. SCHUMACHER: I believe that would be A70.

1 MS. CREMER: Okay. And as to A70, Intervenors,
2 any objection?

3 MR. GANJE: Would you be kind enough to describe
4 the nature and contents of the exhibit.

5 MR. MURPHY: The nature is the Commission's
6 asked to show if the 17, if I remember correctly,
7 turbines that were originally on native grassland are
8 still sited on native grassland or have been removed
9 under the Hessler proposal or the other moves.

10 COMMISSIONER FIEGEN: And if I can just make a
11 comment, I believe Mr. Kirschenmann said there were 19 of
12 the 130. So I just want to see how that number has
13 changed according to the movement of turbines.

14 MR. GANJE: I have no objection.

15 MS. CREMER: Staff.

16 MS. EDWARDS: No objection.

17 MS. CREMER: Thank you.

18 COMMISSIONER NELSON: In relation to the cold
19 weather package, A66, can I have an assurance from the
20 Applicant that when it hits minus 40 that you'll send
21 Mr. Thompson up here to check and make sure it's all
22 working properly?

23 MR. MURPHY: You do recall where he went to
24 school.

25 COMMISSIONER NELSON: I did, yes. I thought it

1 might be a cultural experience for him.

2 MR. MURPHY: I can assure you, and he is a good
3 friend of mine, I will accompany him to come up here and
4 do that.

5 COMMISSIONER NELSON: Perfect.

6 MS. CREMER: Okay. Seeing nothing else, we're
7 done with the witnesses.

8 The posthearing schedule will be that briefs
9 should be filed by noon on July 2. The Commission will
10 hear oral argument and issue its decision on July 9. And
11 we will come up with a time and how long you're going to
12 have.

13 The order must be out by July 30. This schedule
14 is very similar to all the previous schedules due to the
15 six-month turnaround.

16 I would like to receive findings and conclusions
17 from the parties, but you are not required to do so.

18 And before I give the gavel back to Chairman
19 Hanson, is there anything else?

20 Seeing nothing, hearing nothing, this concludes
21 my Hearing Examiner portion of this. And thank you,
22 everyone. It went much more quickly than I had
23 anticipated, and I appreciate everyone's courtesies.

24 CHAIRMAN HANSON: Thank you, Hearing Examiner
25 Karen -- or Ms. Cremer. Appreciate it very much. And

1 thank you to everyone who testified and participated. We
2 appreciate the process. Every time we go through one of
3 these it's different, and we learn different things.

4 And from my standpoint, I really appreciate when
5 folks are as open as they have been and provide the
6 information very quickly when we ask for it. And safe
7 travels to you. I will turn to either of my fellow
8 Commissioners if they have something to say.

9 COMMISSIONER NELSON: I would just simply say
10 thank you to all the parties. I know we have very
11 entrenched positions here, and I appreciate the vigorous
12 advocacy on both sides and your willingness to
13 participate in the process.

14 Thank you.

15 CHAIRMAN HANSON: With that.

16 COMMISSIONER NELSON: Move to adjourn.

17 CHAIRMAN HANSON: Thank you.

18 Commissioner Nelson.

19 COMMISSIONER NELSON: Aye.

20 CHAIRMAN HANSON: Commissioner Fiegen.

21 COMMISSIONER FIEGEN: Fiegen votes aye.

22 CHAIRMAN HANSON: Hanson votes aye. We are
23 adjourned.

24 (The hearing is adjourned at 4:45 p.m.)
25

1 STATE OF SOUTH DAKOTA)

2 :SS

CERTIFICATE

3 COUNTY OF SULLY)

4

5 I, CHERI MCCOMSEY WITTLER, a Registered
6 Professional Reporter, Certified Realtime Reporter and
7 Notary Public in and for the State of South Dakota:

8 DO HEREBY CERTIFY that as the duly-appointed
9 shorthand reporter, I took in shorthand the proceedings
10 had in the above-entitled matter on the 12th day of
11 June, 2019, and that the attached is a true and correct
12 transcription of the proceedings so taken.

13 Dated at Onida, South Dakota this 29th day of
14 June, 2019.

15

16

17

18

19

20

21

22

23

24

25

/s/ Cheri McComsey Wittler
Cheri McComsey Wittler,
Notary Public and
Registered Professional Reporter
Certified Realtime Reporter

\$	1-46 [1] - 334:18	509:24, 510:3, 550:1	346:5, 346:18,	22 [6] - 374:12, 1
\$20,000 [1] - 442:18	1-6 [1] - 334:12	15,000 [1] - 517:6	353:13, 353:18,	380:22, 382:9,
\$5,000 [1] - 555:19	1-7 [2] - 333:15,	15-minute [1] - 392:15	391:22, 418:18,	516:15, 516:20,
'	333:16	15.7 [1] - 488:13	418:19, 426:15,	517:16
'17-18 [1] - 333:6	1-8 [1] - 334:12	153 [1] - 330:11	427:2, 428:7,	221 [1] - 330:18
'Communicated [2] -	1-9 [2] - 333:16,	154 [1] - 330:11	428:11, 428:14,	23 [5] - 382:10,
337:13, 338:4	334:13	158 [1] - 330:12	428:17, 430:20,	382:11, 383:6,
/	1/22/19 [2] - 341:5,	16 [14] - 336:3, 338:16,	451:1, 472:1, 472:3,	433:5, 452:7
/s [1] - 585:17	341:6	376:22, 377:3,	489:5, 550:1	232 [1] - 330:19
1	10 [21] - 335:16,	377:4, 381:19,	20-minute [1] - 469:19	24 [3] - 356:18, 416:9,
1 [41] - 333:15, 333:16,	336:20, 339:7,	382:3, 383:6,	200 [1] - 343:24	447:17
334:7, 334:8, 334:8, 334:9,	343:11, 392:4,	545:16, 554:19,	2001 [1] - 415:16	25 [10] - 344:5, 357:25,
334:12, 334:12,	412:4, 412:5, 413:7,	555:6, 556:4,	2004 [2] - 415:20,	391:22, 393:1,
334:13, 334:13,	428:13, 428:22,	564:23, 565:14	428:16	393:11, 398:2,
334:14, 334:14,	428:25, 430:4,	168 [1] - 330:14	2007 [1] - 340:22	426:15, 457:11,
334:15, 334:15,	444:9, 444:10,	17 [8] - 336:4, 423:1,	2008 [1] - 497:11	488:2, 488:12
334:16, 334:16,	445:23, 451:5,	460:19, 463:1,	2009 [5] - 340:20,	250 [1] - 330:19
334:17, 334:17,	456:3, 456:12,	480:13, 480:16,	451:10, 461:18,	2535-CE-100 [2] -
334:18, 334:18,	498:17, 499:19,	480:17, 582:6	467:21, 468:6	339:5, 339:7
334:19, 334:20,	509:17	174 [1] - 330:14	2011 [12] - 338:10,	257 [1] - 330:20
334:20, 334:23,	10-day [1] - 518:5	18-year [1] - 399:1	340:12, 475:7,	26 [3] - 339:15, 356:7,
335:6, 336:7, 336:7,	10-minute [4] - 412:2,	188 [1] - 330:15	475:8, 476:10,	577:17
336:8, 336:13,	412:10, 413:24,	19 [8] - 330:4, 356:4,	476:17, 477:8,	270 [1] - 330:20
336:24, 338:20,	468:18	382:6, 383:6, 529:9,	478:17, 479:2,	271 [1] - 330:21
338:20, 338:21,	10-year [1] - 514:21	529:13, 581:18,	479:4, 479:13,	275 [1] - 330:21
338:21, 338:23,	10.3 [1] - 488:16	582:11	479:14	278 [1] - 331:4
338:23, 341:11,	100 [12] - 355:15,	1999/2000 [1] - 337:5	2012 [5] - 338:8,	281 [1] - 331:4
404:17, 487:15,	359:24, 399:8,	1A [1] - 381:8	339:7, 340:22,	286 [1] - 331:5
516:6	400:5, 430:17,	2	453:6, 489:22	29 [3] - 344:13,
1,000 [4] - 425:13,	452:17, 455:9,	2 [26] - 333:15, 335:3,	2013 [1] - 334:5	355:20, 458:4
453:19, 455:4,	479:17, 489:13,	335:7, 336:16,	2014 [18] - 340:20,	292 [1] - 331:5
492:15	521:9, 521:15,	357:14, 390:5,	340:21, 340:21,	296 [1] - 331:6
1,200 [3] - 453:6,	524:14	390:13, 390:16,	453:6, 459:6,	299 [1] - 331:8
457:4, 487:17	102 [1] - 487:14	390:18, 390:19,	459:19, 459:20,	29th [1] - 585:13
1,238 [1] - 487:18	106 [6] - 330:6,	398:10, 428:1,	462:23, 463:1,	2MW [1] - 336:24
1,600 [1] - 462:12	395:14, 396:22,	429:5, 431:17,	463:3, 463:10,	3
1-1 [1] - 333:14	397:3, 397:11,	456:25, 457:10,	465:11, 465:20,	3 [17] - 335:4, 335:8,
1-10 [2] - 333:17,	397:13	464:15, 473:23,	470:13, 472:6,	336:13, 336:17,
334:13	10:00 [1] - 495:19	475:8, 494:3,	480:8, 480:24, 481:5	341:12, 395:12,
1-11 [2] - 334:9,	10:15 [1] - 392:17	546:13, 546:19,	2016 [6] - 344:5,	395:15, 395:21,
334:14	11 [2] - 335:17, 336:21	546:23, 547:12,	353:16, 450:12,	396:12, 487:7,
1-12 [5] - 334:10,	11.7 [1] - 490:10	547:21, 583:9	461:9, 466:24, 530:1	521:23, 527:25,
334:21, 334:22	12 [4] - 328:8, 335:18,	2-13 [2] - 334:9,	2017 [9] - 516:7,	528:5, 528:25,
1-13 [2] - 333:15,	336:21, 490:11	334:20	516:13, 516:16,	539:8, 555:7
334:15	12.5 [1] - 490:11	2-15 [2] - 334:8,	516:20, 517:16,	3-10 [1] - 336:8
1-152 [1] - 334:18	12th [2] - 329:4,	334:20	517:17, 545:17,	3-2 [1] - 336:7
1-17 [1] - 334:15	585:10	2-30 [1] - 334:7	545:23	3-5 [1] - 336:7
1-18 [1] - 334:16	13 [4] - 335:20,	2-41 [1] - 336:22	2019 [14] - 328:8,	30 [20] - 346:15,
1-20 [1] - 334:16	335:22, 336:22,	2-8 [2] - 334:8, 334:19	329:4, 344:13,	347:16, 348:11,
1-22 [1] - 334:17	543:1	2.4 [1] - 392:6	355:20, 356:10,	351:13, 361:3,
1-23 [1] - 334:17	130 [1] - 582:12	2.6 [1] - 457:6	356:18, 396:13,	361:7, 361:10,
1-26-19 [1] - 555:7	133 [1] - 330:9	2/19/19 [4] - 341:7,	416:10, 433:6,	362:25, 373:5,
	136 [2] - 330:9, 581:10	341:8, 341:11,	452:1, 452:7,	380:21, 401:11,
	14 [2] - 335:23, 545:23	341:12	498:17, 585:11,	445:7, 455:11,
	14-day [2] - 411:17,	2/26/19 [2] - 341:9,	585:14	455:17, 489:5,
	411:23	341:10	2019.5.24 [1] - 340:23	516:7, 516:12,
	142 [1] - 330:10	20 [23] - 343:14,	202 [1] - 330:15	517:17, 564:11,
	144 [1] - 330:10	344:10, 345:22,	213 [1] - 328:24	583:13
	15 [7] - 335:24, 342:8,		215 [1] - 330:16	
	452:18, 479:14,		217 [1] - 330:16	

<div>301 [1] - 331:8</div> <div>308 [1] - 331:9</div> <div>310 [1] - 331:9</div> <div>328-585 [1] - 328:9</div> <div>342 [1] - 331:11</div> <div>35 [2] - 388:10, 457:9</div> <div>36 [1] - 361:8</div> <div>36-18A-1.1 [1] - 350:8</div> <div>365 [1] - 468:14</div> <div>37 [2] - 361:9, 400:22</div> <div>372 [1] - 331:12</div> <div>375 [1] - 331:12</div> <div>384 [1] - 331:13</div> <div>39 [1] - 458:5</div> <div>3:30 [1] - 540:19</div> <div>3a [2] - 333:13, 336:17</div>	<div>431 [1] - 331:17</div> <div>432 [1] - 331:19</div> <div>436 [1] - 331:20</div> <div>438 [1] - 331:20</div> <div>447 [1] - 331:21</div> <div>45 [34] - 358:12, 405:25, 425:17, 425:22, 426:2, 431:11, 431:15, 438:18, 445:12, 454:2, 454:15, 457:1, 457:7, 457:19, 460:14, 460:22, 463:25, 464:21, 467:11, 468:16, 468:18, 469:7, 469:12, 472:18, 473:21, 474:4, 474:11, 476:19, 477:3, 481:12, 481:21, 481:25, 483:1, 492:21</div> <div>450 [1] - 331:23</div> <div>458 [1] - 331:23</div> <div>46 [15] - 429:14, 435:16, 437:25, 438:1, 438:9, 438:20, 453:12, 456:6, 467:8, 486:24, 487:1, 488:3, 488:15, 492:6</div> <div>47 [1] - 490:1</div> <div>48 [1] - 429:13</div> <div>483 [1] - 331:24</div> <div>485 [1] - 331:24</div> <div>49 [5] - 383:6, 383:12, 402:12, 402:15, 403:5</div> <div>497 [1] - 332:4</div> <div>4:45 [1] - 584:24</div>	<div>466:2, 477:1, 486:10</div> <div>50/60 [1] - 336:24</div> <div>500 [1] - 329:3</div> <div>50s [2] - 438:7, 438:14</div> <div>512 [1] - 332:4</div> <div>513 [1] - 332:5</div> <div>518 [1] - 332:5</div> <div>52 [2] - 576:8, 579:25</div> <div>53 [6] - 438:15, 576:8, 576:11, 576:17, 576:20, 579:25</div> <div>538 [1] - 332:6</div> <div>54 [8] - 477:2, 490:17, 576:8, 576:11, 576:14, 576:17, 576:19, 579:25</div> <div>541 [1] - 332:8</div> <div>544 [1] - 332:8</div> <div>548 [1] - 332:9</div> <div>55 [5] - 363:13, 363:19, 363:23, 453:19, 492:15</div> <div>550 [4] - 332:9, 462:3, 462:9, 462:11</div> <div>551 [1] - 332:10</div> <div>552 [1] - 332:12</div> <div>557 [1] - 332:12</div> <div>56 [3] - 363:10, 363:12, 363:25</div> <div>562 [1] - 332:13</div> <div>57 [2] - 330:5, 364:3</div> <div>572 [1] - 332:13</div> <div>58 [2] - 364:4, 364:16</div> <div>59 [5] - 361:8, 364:6, 364:13, 364:14, 364:20</div>	<div>580:1</div> <div>68 [7] - 382:12, 382:13, 383:10, 545:12, 577:23, 580:1</div> <div>69 [3] - 545:22, 577:25, 580:1</div> <div>6s [1] - 396:7</div>	<div>547:21, 548:10</div> <div>A1-C [1] - 333:5</div> <div>A1-D [1] - 333:6</div> <div>A1-E [6] - 333:6, 546:13, 546:19, 546:23, 547:12, 547:20</div> <div>A1-F [1] - 333:7</div> <div>A1-G [1] - 333:7</div> <div>A1-H [5] - 333:8, 366:17, 366:18, 366:20, 403:15</div> <div>A1-I [2] - 333:8, 403:15</div> <div>A1-J [1] - 333:9</div> <div>A1-K [1] - 333:9</div> <div>A1-L [1] - 333:10</div> <div>A1-M [1] - 333:10</div> <div>A10 [3] - 333:19, 356:6, 366:7</div> <div>A11 [3] - 333:20, 356:7, 366:7</div> <div>A12 [1] - 333:21</div> <div>A13 [1] - 333:22</div> <div>A14 [1] - 334:3</div> <div>A15 [1] - 334:5</div> <div>A16 [1] - 334:7</div> <div>A16-1 [1] - 334:7</div> <div>A16-2 [1] - 334:8</div> <div>A16-3 [1] - 334:8</div> <div>A16-4 [1] - 334:9</div> <div>A17 [1] - 334:9</div> <div>A18 [1] - 334:10</div> <div>A19 [1] - 334:10</div> <div>A2 [4] - 333:11, 344:13, 355:20, 366:6</div> <div>A20 [1] - 334:11</div> <div>A20-1 [1] - 334:12</div> <div>A20-10 [1] - 334:16</div> <div>A20-11 [1] - 334:17</div> <div>A20-12 [1] - 334:17</div> <div>A20-13 [1] - 334:18</div> <div>A20-14 [1] - 334:18</div> <div>A20-15 [1] - 334:19</div> <div>A20-16 [1] - 334:20</div> <div>A20-17 [1] - 334:20</div> <div>A20-18 [1] - 334:21</div> <div>A20-19 [1] - 334:21</div> <div>A20-2 [1] - 334:12</div> <div>A20-20 [1] - 334:22</div> <div>A20-3 [1] - 334:13</div> <div>A20-4 [1] - 334:13</div> <div>A20-5 [1] - 334:14</div> <div>A20-6 [1] - 334:14</div> <div>A20-7 [1] - 334:15</div> <div>A20-8 [1] - 334:15</div> <div>A20-9 [1] - 334:16</div> <div>A21 [1] - 334:22</div>
4			7	
4 [10] - 335:9, 339:3, 339:5, 457:8, 476:7, 476:8, 481:11, 481:20, 482:22, 527:25			7 [17] - 335:13, 336:18, 339:12, 339:12, 339:13, 395:13, 395:14, 411:12, 422:24, 453:8, 456:7, 457:4, 457:10, 467:9, 470:19, 486:20, 490:1	
4-1 [1] - 340:24			70 [2] - 486:10, 546:1	
40 [50] - 389:13, 389:22, 457:1, 457:7, 457:9, 460:14, 460:21, 461:16, 462:3, 462:9, 462:12, 463:13, 463:23, 463:24, 466:15, 466:17, 466:18, 467:15, 468:10, 469:5, 469:13, 469:17, 470:3, 470:10, 472:11, 472:16, 472:18, 472:21, 473:11, 473:21, 474:1, 474:15, 474:19, 475:9, 475:19, 476:2, 476:3, 476:19, 477:3, 481:7, 481:12, 481:14, 481:21, 481:25, 482:7, 485:17, 488:3, 488:15, 582:20			700 [1] - 467:3	
402 [1] - 331:13			7030.0040 [1] - 339:8	
404 [1] - 331:14			7030.0050 [1] - 339:8	
41 [1] - 330:4			71 [9] - 544:11, 544:12, 544:14, 546:3, 546:25, 547:3, 547:16, 547:21, 548:10	
415 [1] - 331:16			734 [1] - 487:19	
418 [1] - 331:16			7:00 [1] - 342:11	
42 [2] - 383:17				8
422 [1] - 331:17				8 [4] - 335:14, 336:19, 460:18, 463:1
43 [1] - 389:13				820 [3] - 453:7, 456:6, 457:5
43-19.1-27(5) [1] - 350:9				8:30 [2] - 328:8, 329:5
	5	6	9	A
	5 [8] - 335:10, 421:5, 437:22, 457:9, 469:4, 482:24, 527:25, 528:5	6 [16] - 333:23, 334:3, 335:12, 336:18, 339:11, 340:6, 395:13, 395:14, 396:3, 396:5, 396:6, 396:21, 460:18, 462:25, 490:12	9 [5] - 335:15, 356:10, 452:1, 478:2, 583:10	a.m [2] - 328:8, 329:5
	5-1 [1] - 336:13	6-1 [1] - 338:23	9-B [1] - 458:23	A1 [1] - 333:3
	5-12 [1] - 338:21	6-2 [1] - 338:23	90 [1] - 415:22	A1-A [1] - 333:3
	5-2 [2] - 336:25, 338:20	60 [5] - 363:13, 364:22, 383:10	96 [1] - 458:2	A1-B [9] - 333:4, 544:11, 544:13, 545:11, 546:25, 547:3, 547:16,
	5-5 [1] - 338:20	62 [3] - 577:16, 578:20, 580:1	9613-2 [1] - 419:22	
	5-7 [1] - 338:21	63 [1] - 580:1	98 [1] - 330:5	
	50 [15] - 358:1, 358:10, 358:13, 389:14, 389:15, 396:25, 398:2, 429:10, 430:11, 438:18, 453:23, 454:3,	64 [1] - 580:1	9a [1] - 336:19	
		65 [2] - 577:19, 580:1	9b [1] - 336:20	
		66 [2] - 577:20, 580:1		
		666 [1] - 396:17		
		67 [6] - 382:12, 382:13, 383:10, 577:23, 577:24,		

<p>A22 [4] - 334:23, 356:10, 366:7, 395:25</p> <p>A22-1 [3] - 334:23, 356:11, 366:7</p> <p>A22-2 [3] - 335:3, 356:11, 366:7</p> <p>A22-3 [3] - 335:4, 356:11, 366:7</p> <p>A23 [1] - 335:5</p> <p>A24 [3] - 335:6, 452:1, 487:6</p> <p>A24-1 [2] - 335:6, 452:1</p> <p>A24-10 [2] - 335:16, 480:4</p> <p>A24-11 [1] - 335:17</p> <p>A24-12 [1] - 335:18</p> <p>A24-13 [1] - 335:20</p> <p>A24-13A [1] - 335:22</p> <p>A24-14 [1] - 335:23</p> <p>A24-15 [1] - 335:24</p> <p>A24-16 [1] - 336:3</p> <p>A24-17 [2] - 336:4, 452:2</p> <p>A24-2 [3] - 335:7, 475:2, 475:8</p> <p>A24-3 [1] - 335:8</p> <p>A24-4 [1] - 335:9</p> <p>A24-5 [1] - 335:10</p> <p>A24-6 [1] - 335:12</p> <p>A24-7 [1] - 335:13</p> <p>A24-8 [1] - 335:14</p> <p>A24-9 [1] - 335:15</p> <p>A25 [1] - 336:5</p> <p>A26 [1] - 336:6</p> <p>A26-1 [1] - 336:7</p> <p>A26-2 [1] - 336:7</p> <p>A26-3 [1] - 336:8</p> <p>A27 [1] - 336:8</p> <p>A28 [1] - 336:9</p> <p>A29 [1] - 336:9</p> <p>A3 [1] - 333:11</p> <p>A30 [1] - 336:10</p> <p>A31 [1] - 336:10</p> <p>A31-1 [1] - 336:11</p> <p>A32 [1] - 336:12</p> <p>A32-1 [1] - 336:13</p> <p>A32-2 [1] - 336:13</p> <p>A33 [1] - 336:14</p> <p>A34 [1] - 336:15</p> <p>A35 [1] - 336:16</p> <p>A35-1 [1] - 336:16</p> <p>A35-10 [1] - 336:21</p> <p>A35-11 [1] - 336:21</p> <p>A35-12 [1] - 336:22</p> <p>A35-2 [1] - 336:17</p> <p>A35-3 [1] - 336:17</p> <p>A35-4 [1] - 336:18</p>	<p>A35-5 [1] - 336:18</p> <p>A35-6 [1] - 336:19</p> <p>A35-7 [1] - 336:19</p> <p>A35-8 [1] - 336:20</p> <p>A35-9 [1] - 336:20</p> <p>A36 [1] - 336:22</p> <p>A37 [1] - 336:23</p> <p>A37-1 [1] - 336:23</p> <p>A37-2 [2] - 336:24, 336:25</p> <p>A37-3 [1] - 337:3</p> <p>A38 [2] - 337:4, 452:8</p> <p>A38-1 [2] - 337:4, 452:8</p> <p>A38-2 [1] - 337:5</p> <p>A38-3 [1] - 337:5</p> <p>A38-4 [1] - 337:7</p> <p>A38-5 [1] - 337:9</p> <p>A38-6 [1] - 337:10</p> <p>A38-7 [2] - 337:11, 452:9</p> <p>A39 [1] - 337:13</p> <p>A39-1 [1] - 337:14</p> <p>A39-2 [1] - 337:14</p> <p>A39-3 [1] - 337:15</p> <p>A4 [1] - 333:12</p> <p>A40 [2] - 337:16, 433:6</p> <p>A40-1 [2] - 337:16, 433:7</p> <p>A40-2 [1] - 337:17</p> <p>A40-3 [1] - 337:18</p> <p>A40-4 [1] - 337:19</p> <p>A40-5 [1] - 337:21</p> <p>A40-6 [1] - 337:22</p> <p>A40-7 [1] - 337:23</p> <p>A40-8 [1] - 338:3</p> <p>A40-9 [2] - 338:5, 433:7</p> <p>A41 [2] - 338:6, 416:10</p> <p>A41-1 [2] - 338:7, 416:11</p> <p>A41-2 [2] - 338:7, 416:11</p> <p>A41-3 [2] - 338:8, 416:11</p> <p>A41-4 [2] - 338:10, 416:11</p> <p>A42 [1] - 338:11</p> <p>A42-1 [1] - 338:11</p> <p>A43 [3] - 338:12, 356:18, 366:7</p> <p>A43-1 [3] - 338:12, 356:19, 366:7</p> <p>A43-2 [3] - 338:13, 356:19, 366:7</p> <p>A43-3 [3] - 338:14, 356:19, 366:8</p> <p>A43-4 [3] - 338:15, 356:19, 366:8</p>	<p>A43-5 [3] - 338:16, 356:20, 366:8</p> <p>A44 [1] - 338:17</p> <p>A44-1 [1] - 338:18</p> <p>A44-2 [1] - 338:18</p> <p>A45 [1] - 338:19</p> <p>A45-1 [1] - 338:20</p> <p>A45-2 [1] - 338:20</p> <p>A45-3 [1] - 338:21</p> <p>A45-4 [1] - 338:21</p> <p>A46 [1] - 338:22</p> <p>A46-1 [1] - 338:23</p> <p>A46-2 [1] - 338:23</p> <p>A47 [1] - 338:24</p> <p>a48 [1] - 339:3</p> <p>A49 [1] - 339:5</p> <p>A5 [1] - 333:12</p> <p>A50 [1] - 339:7</p> <p>A51 [1] - 339:8</p> <p>A52 [1] - 576:1</p> <p>A53 [2] - 339:9, 576:1</p> <p>A54 [3] - 339:10, 576:2, 576:24</p> <p>A55 [3] - 339:10, 362:11, 366:8</p> <p>A56 [4] - 339:11, 362:11, 366:8, 375:20</p> <p>A57 [9] - 339:11, 362:11, 366:8, 377:15, 383:24, 384:1, 404:16, 404:18</p> <p>A58 [7] - 339:12, 362:12, 364:11, 365:8, 366:8, 390:22, 426:12</p> <p>A59 [3] - 339:12, 362:12, 366:8</p> <p>A6 [1] - 333:13</p> <p>A6-1 [1] - 580:3</p> <p>A60 [4] - 339:13, 362:12, 366:3, 366:8</p> <p>A61 [4] - 339:14, 542:22, 556:6, 580:10</p> <p>A62 [3] - 339:15, 577:16, 578:15</p> <p>A63 [5] - 339:15, 410:22, 420:6, 577:16, 577:17</p> <p>A64 [2] - 339:16, 577:19</p> <p>A65 [1] - 339:16</p> <p>A66 [2] - 339:17, 582:19</p> <p>A67 [1] - 339:18</p> <p>A68 [2] - 339:18, 577:24</p> <p>A69 [2] - 339:19,</p>	<p>579:15</p> <p>A7 [1] - 333:14</p> <p>A7-1 [1] - 333:14</p> <p>A7-2 [1] - 333:15</p> <p>A7-3 [1] - 333:15</p> <p>A7-4 [1] - 333:16</p> <p>A7-5 [1] - 333:16</p> <p>A7-6 [1] - 333:17</p> <p>A70 [3] - 339:19, 581:25, 582:1</p> <p>A8 [3] - 333:17, 356:4, 366:6</p> <p>A9 [3] - 333:18, 356:4, 366:6</p> <p>abandoned [5] - 397:1, 397:4, 397:7, 397:10, 397:16</p> <p>abandonment [1] - 533:10</p> <p>abilities [1] - 558:15</p> <p>ability [4] - 374:16, 505:21, 517:10, 521:25</p> <p>able [14] - 345:18, 345:21, 409:5, 448:18, 448:19, 467:6, 468:1, 495:20, 530:21, 536:3, 547:5, 566:20, 568:2, 579:2</p> <p>above-entitled [2] - 329:2, 585:10</p> <p>absence [3] - 463:15, 472:23, 481:16</p> <p>absolute [2] - 425:17, 445:11</p> <p>absolutely [6] - 386:10, 445:11, 484:22, 489:19, 545:1, 551:20</p> <p>absolutes [1] - 445:14</p> <p>Academic [1] - 337:9</p> <p>accept [2] - 520:19, 538:23</p> <p>acceptable [2] - 474:3, 474:12</p> <p>accepted [4] - 499:8, 499:9, 519:23, 521:20</p> <p>accepting [1] - 556:2</p> <p>access [1] - 542:7</p> <p>accessible [1] - 546:14</p> <p>accommodating [1] - 410:19</p> <p>accommodation [1] - 540:16</p> <p>accompany [1] - 583:3</p> <p>accompanying [4] -</p>	<p>356:19, 416:10, 433:6, 452:8</p> <p>according [1] - 582:13</p> <p>account [8] - 359:9, 361:19, 554:6, 555:17, 555:25, 565:24, 570:25, 571:9</p> <p>Account [1] - 335:12</p> <p>accounting [1] - 491:14</p> <p>accumulation [1] - 528:11</p> <p>accurate [3] - 426:5, 534:6, 553:8</p> <p>accurately [4] - 368:15, 412:8, 412:13, 499:4</p> <p>accustomed [1] - 442:8</p> <p>achieved [1] - 460:25</p> <p>acknowledge [1] - 375:8</p> <p>acknowledged [1] - 350:4</p> <p>Acoustic [1] - 333:7</p> <p>acoustics [1] - 415:6</p> <p>acquisition [1] - 516:19</p> <p>acreages [1] - 490:6</p> <p>acres [1] - 517:6</p> <p>Act [1] - 337:24</p> <p>action [1] - 342:18</p> <p>actions [1] - 521:13</p> <p>active [1] - 467:4</p> <p>activities [8] - 417:13, 417:14, 423:22, 497:19, 504:21, 525:6, 525:8</p> <p>activity [4] - 424:16, 424:18, 531:24</p> <p>actual [13] - 364:6, 367:4, 384:4, 393:19, 401:12, 412:17, 460:17, 477:15, 477:21, 487:21, 501:9, 520:6, 535:2</p> <p>AD [1] - 341:7</p> <p>Adam [1] - 328:15</p> <p>add [13] - 349:2, 388:4, 388:7, 390:18, 390:19, 398:9, 408:10, 409:21, 427:2, 492:12, 537:5, 555:15, 555:24</p> <p>added [6] - 357:14, 358:7, 411:25, 431:17, 457:17,</p>
---	---	--	--	---

<p>554:19</p> <p>adding [1] - 413:7</p> <p>addition [13] - 358:15, 358:21, 392:2, 415:25, 416:24, 434:5, 441:16, 451:18, 464:4, 464:7, 474:5, 477:13, 568:12</p> <p>additional [20] - 351:14, 356:2, 356:6, 356:15, 357:14, 362:8, 370:7, 372:2, 385:6, 386:11, 413:7, 431:16, 502:1, 508:4, 510:20, 526:1, 550:22, 550:23, 571:10, 573:21</p> <p>Additional [4] - 340:5, 340:6, 341:10, 341:11</p> <p>additions [2] - 542:11, 576:15</p> <p>address [7] - 376:21, 423:3, 432:17, 438:7, 444:7, 543:5, 572:19</p> <p>addressed [3] - 452:22, 553:14, 553:17</p> <p>addressing [2] - 433:24, 445:24</p> <p>adds [3] - 352:19, 390:11, 421:6</p> <p>ADHD [6] - 443:22, 448:14, 448:15, 448:17, 448:20, 449:13</p> <p>adhering [2] - 394:16, 454:1</p> <p>adjacent [3] - 362:5, 362:7, 442:13</p> <p>adjourn [1] - 584:16</p> <p>adjourned [2] - 584:23, 584:24</p> <p>adjunct [3] - 451:2, 485:18, 485:19</p> <p>adjustment [4] - 390:6, 531:17, 531:22, 532:7</p> <p>adjustments [2] - 409:16, 532:2</p> <p>administered [7] - 342:21, 414:24, 432:7, 450:2, 496:24, 540:24, 552:10</p> <p>administrative [2] -</p>	<p>342:7, 555:5</p> <p>admissibility [1] - 351:19</p> <p>admission [2] - 350:18, 370:8</p> <p>admits [1] - 351:19</p> <p>admitted [8] - 372:8, 372:10, 404:2, 541:21, 553:3, 575:8, 580:1, 581:6</p> <p>adopt [3] - 498:23, 508:13, 554:17</p> <p>adopted [3] - 336:5, 354:7, 468:16</p> <p>adopting [2] - 364:23, 365:23</p> <p>adults [2] - 448:16, 448:17</p> <p>advance [1] - 421:20</p> <p>advantages [1] - 441:15</p> <p>adverse [6] - 434:13, 434:21, 435:15, 437:24, 438:17, 446:9</p> <p>adversely [2] - 433:19, 486:12</p> <p>advice [1] - 394:16</p> <p>advise [1] - 474:19</p> <p>advisor [1] - 343:15</p> <p>Advisors [1] - 337:14</p> <p>advisors [1] - 384:25</p> <p>advocacy [1] - 584:12</p> <p>advocating [1] - 427:16</p> <p>Aerosmith [1] - 343:11</p> <p>aerospace [1] - 343:11</p> <p>affair [1] - 374:8</p> <p>affect [6] - 374:16, 433:19, 440:7, 444:6, 445:15, 486:22</p> <p>affected [7] - 373:19, 444:8, 449:14, 486:17, 489:10, 491:19, 491:22</p> <p>affecting [3] - 403:4, 444:12, 486:13</p> <p>affects [3] - 352:1, 443:21, 449:9</p> <p>Affidavit [1] - 341:5</p> <p>affiliate [1] - 564:19</p> <p>afternoon [14] - 404:8, 422:3, 422:4, 458:16, 458:17, 485:13, 485:14, 518:11, 518:13, 544:7, 544:8, 549:8,</p>	<p>575:18, 575:21</p> <p>agencies [3] - 515:10, 528:3, 541:13</p> <p>agency [5] - 499:17, 507:9, 519:8, 525:11, 537:14</p> <p>Agency [1] - 333:4</p> <p>agenda [1] - 566:17</p> <p>agent [1] - 343:21</p> <p>aggravate [1] - 444:5</p> <p>aggravated [1] - 449:10</p> <p>Aggregate [1] - 337:6</p> <p>aggressive [4] - 419:5, 427:11, 427:14, 429:25</p> <p>ago [11] - 345:17, 346:2, 394:11, 438:13, 451:5, 454:7, 477:10, 514:15, 516:22, 517:19, 524:5</p> <p>agree [22] - 347:6, 354:11, 372:22, 377:23, 389:17, 389:22, 393:1, 395:6, 417:12, 420:10, 423:9, 426:1, 439:24, 440:2, 440:11, 445:25, 506:22, 520:17, 547:17, 557:4, 557:7, 559:3</p> <p>Agreed [1] - 339:14</p> <p>agreed [8] - 420:25, 506:19, 511:7, 520:15, 555:17, 555:22, 556:6, 580:4</p> <p>agreeing [3] - 377:24, 405:24, 559:7</p> <p>agreement [3] - 419:7, 457:22, 565:25</p> <p>agreements [3] - 575:15, 577:20, 578:17</p> <p>agrees [1] - 557:6</p> <p>agricultural [3] - 500:21, 524:21, 525:3</p> <p>ahead [1] - 407:7</p> <p>aid [2] - 416:22, 450:13</p> <p>air [1] - 451:6</p> <p>airplanes [1] - 444:25</p> <p>airport [1] - 489:12</p> <p>airports [1] - 438:4</p> <p>Allocation [1] - 336:9</p> <p>allow [4] - 438:14, 468:5, 495:5, 555:25</p> <p>allowable [1] - 482:1</p>	<p>almost [3] - 346:15, 418:19, 514:20</p> <p>alone [1] - 421:14</p> <p>alternate [3] - 358:4, 360:11, 363:3</p> <p>alternates [2] - 363:4, 457:24</p> <p>Amber [1] - 334:11</p> <p>ambient [20] - 386:21, 386:25, 387:6, 388:4, 388:6, 388:9, 389:1, 389:3, 389:7, 389:12, 389:18, 389:21, 406:11, 406:14, 416:22, 421:15, 421:16, 464:22, 472:12, 483:2</p> <p>ambiguous [1] - 387:20</p> <p>amended [1] - 577:17</p> <p>Amended [2] - 338:24, 339:15</p> <p>Amendment [1] - 336:9</p> <p>amendment [1] - 410:23</p> <p>American [1] - 548:22</p> <p>Americans [2] - 486:11, 486:15</p> <p>amount [7] - 357:23, 365:18, 384:4, 413:8, 461:11, 504:15, 557:24</p> <p>amounts [1] - 383:18</p> <p>analyses [7] - 415:24, 416:1, 416:4, 416:5, 416:7, 419:6, 436:20</p> <p>Analysis [1] - 340:10</p> <p>analysis [6] - 362:6, 370:1, 418:23, 429:2, 436:13, 527:4</p> <p>analyst [1] - 552:18</p> <p>analyze [1] - 563:13</p> <p>ancillary [2] - 542:4, 542:6</p> <p>AND [1] - 328:5</p> <p>ANDREW [1] - 330:8</p> <p>Andrew [2] - 337:13, 450:7</p> <p>animal [2] - 490:11, 513:25</p> <p>animals [1] - 491:5</p> <p>Ann [1] - 337:7</p> <p>annoy [1] - 442:17</p> <p>Annoyance [4] - 335:9, 335:18, 337:4, 337:6</p> <p>annoyance [36] - 434:4, 434:8,</p>	<p>434:11, 434:12, 434:21, 436:4, 436:17, 436:22, 437:5, 437:10, 440:8, 440:10, 440:13, 440:15, 443:3, 443:4, 443:8, 443:11, 443:14, 445:18, 446:9, 453:9, 455:23, 455:24, 456:11, 456:12, 456:21, 456:23, 457:7, 464:24, 466:7, 482:3, 483:4, 485:1, 488:25, 493:8</p> <p>annoyed [5] - 440:16, 440:18, 441:5, 443:20, 493:11</p> <p>annoying [2] - 434:2, 466:13</p> <p>annoys [2] - 439:25, 440:3</p> <p>annual [4] - 469:2, 505:4, 505:12, 526:2</p> <p>ANSI [3] - 409:18, 409:20, 425:4</p> <p>answer [18] - 346:22, 348:6, 387:21, 392:1, 392:20, 409:1, 409:5, 412:8, 422:18, 423:1, 423:2, 426:19, 448:9, 468:5, 523:11, 531:9, 560:25, 564:5</p> <p>answered [9] - 348:19, 375:10, 410:2, 470:10, 482:16, 485:17, 493:10, 560:19, 562:10</p> <p>answering [3] - 389:11, 438:16, 443:25</p> <p>answers [3] - 387:20, 541:23, 564:8</p> <p>anticipate [3] - 427:1, 483:15, 509:21</p> <p>anticipated [2] - 405:16, 583:23</p> <p>anticipating [1] - 412:22</p> <p>anticipation [2] - 393:21, 509:22</p> <p>anyway [1] - 562:9</p> <p>AO [1] - 341:8</p> <p>apologies [1] - 518:2</p> <p>apologize [4] - 380:11, 475:12,</p>
---	--	--	---	---

<p>540:15, 551:12</p> <p>App [2] - 341:5, 341:6</p> <p>appear [2] - 496:16, 500:15</p> <p>appeared [3] - 451:13, 451:15, 451:21</p> <p>appearing [5] - 328:19, 328:21, 328:22, 451:12, 461:13</p> <p>Appendices [4] - 333:18, 333:19, 341:6, 341:7</p> <p>appendices [1] - 379:20</p> <p>Appendix [26] - 333:3, 333:4, 333:5, 333:6, 333:6, 333:7, 333:7, 333:8, 333:8, 333:9, 333:9, 333:10, 333:10, 333:18, 333:19, 333:20, 333:21, 334:21, 334:21, 334:22, 339:11, 339:11, 339:18, 339:18, 577:24, 577:25</p> <p>appendix [1] - 379:2</p> <p>Appendixes [2] - 334:9, 334:10</p> <p>applicable [1] - 403:9</p> <p>APPLICANT [9] - 330:7, 331:2, 333:2, 334:2, 335:2, 336:2, 337:2, 338:2, 339:2</p> <p>Applicant [49] - 342:19, 344:17, 350:16, 352:6, 366:18, 370:4, 375:3, 397:24, 405:19, 406:15, 413:17, 413:19, 414:22, 418:1, 430:25, 439:5, 495:25, 512:4, 516:15, 521:22, 523:23, 525:8, 529:12, 529:23, 543:25, 548:6, 555:17, 556:5, 557:5, 557:8, 557:25, 558:18, 559:17, 560:16, 561:13, 562:5, 563:23, 567:22, 568:3, 568:20, 570:11, 570:14, 571:5, 571:14, 572:14, 572:16, 572:19, 580:21,</p>	<p>582:20</p> <p>Applicant's [13] - 334:18, 336:14, 336:15, 336:25, 338:19, 338:22, 340:3, 366:17, 367:16, 458:21, 475:1, 480:3, 548:6</p> <p>applicants [2] - 413:15, 559:24</p> <p>APPLICATION [1] - 328:4</p> <p>application [3] - 500:6, 512:16, 518:20</p> <p>Application [15] - 333:3, 336:9, 346:25, 347:9, 347:13, 371:12, 375:5, 500:3, 501:4, 501:8, 502:10, 511:6, 511:7, 521:10, 529:19</p> <p>applications [6] - 369:7, 371:6, 373:9, 498:5, 498:11, 552:22</p> <p>applied [3] - 358:15, 361:3, 401:13</p> <p>apply [2] - 403:23, 554:24</p> <p>appointed [1] - 585:8</p> <p>appraiser [1] - 354:21</p> <p>appreciate [24] - 354:10, 374:2, 386:2, 394:15, 398:16, 401:7, 401:16, 401:18, 410:6, 412:20, 413:13, 414:3, 445:16, 446:12, 446:13, 526:9, 532:18, 532:20, 540:16, 583:23, 583:25, 584:2, 584:4, 584:11</p> <p>approach [15] - 363:6, 368:3, 381:2, 387:12, 387:14, 398:1, 420:18, 420:23, 448:22, 515:7, 517:11, 521:22, 525:24, 533:14, 546:11</p> <p>approached [1] - 451:8</p> <p>approaches [2] - 398:12, 546:18</p> <p>appropriate [6] - 454:14, 473:20,</p>	<p>481:11, 512:24, 527:5, 576:5</p> <p>approved [3] - 367:13, 464:8, 559:20</p> <p>April [10] - 338:10, 356:10, 395:12, 395:15, 395:21, 396:12, 452:1, 516:6, 531:7</p> <p>archaeological [2] - 542:18, 543:16</p> <p>architects [1] - 343:3</p> <p>architectural [1] - 542:2</p> <p>architecture [1] - 543:18</p> <p>Area [1] - 339:8</p> <p>area [54] - 367:4, 368:7, 379:25, 437:21, 444:2, 447:19, 500:10, 500:16, 501:5, 501:12, 501:13, 502:22, 503:1, 503:2, 503:11, 503:12, 505:17, 506:17, 507:1, 508:2, 510:21, 513:23, 514:18, 516:7, 517:1, 517:6, 518:4, 522:1, 522:4, 522:5, 522:25, 526:17, 526:19, 526:21, 526:23, 528:20, 533:5, 534:5, 536:7, 536:8, 537:11, 546:20, 546:22, 547:8, 547:11, 547:12, 547:13, 547:20, 548:9, 551:9, 551:18, 563:16, 564:2</p> <p>areas [20] - 424:17, 447:15, 452:21, 455:5, 500:22, 501:7, 501:15, 501:22, 502:6, 502:9, 503:6, 504:5, 507:22, 520:25, 521:2, 524:12, 542:9, 563:13, 563:16, 563:17</p> <p>argument [4] - 349:7, 371:25, 372:7, 583:10</p> <p>argumentative [1] - 560:20</p> <p>arguments [1] - 388:20</p>	<p>array [3] - 356:15, 358:19, 576:22</p> <p>arrays [1] - 356:1</p> <p>arrive [2] - 440:21, 527:9</p> <p>art [2] - 484:21, 493:3</p> <p>Art [3] - 549:22, 549:24, 567:10</p> <p>article [15] - 425:7, 459:17, 463:6, 466:24, 475:8, 475:23, 476:7, 477:6, 477:8, 478:3, 478:9, 479:14, 480:10, 480:13, 481:6</p> <p>articles [3] - 459:13, 474:10, 479:15</p> <p>asbestos [1] - 449:6</p> <p>ascertain [3] - 514:9, 515:12, 533:9</p> <p>aspects [3] - 420:17, 434:9, 437:2</p> <p>Asperger [1] - 444:7</p> <p>Asperger's [2] - 444:18, 445:20</p> <p>assess [1] - 525:20</p> <p>assessed [1] - 524:2</p> <p>assessing [1] - 478:7</p> <p>Assessing [2] - 338:8, 340:12</p> <p>assessment [4] - 385:14, 385:21, 385:22, 573:19</p> <p>Assessment [3] - 333:7, 337:7, 340:23</p> <p>assessments [4] - 343:18, 441:24, 451:6, 451:7</p> <p>assist [1] - 525:13</p> <p>associate [1] - 415:5</p> <p>Associated [1] - 335:19</p> <p>associated [10] - 432:18, 433:16, 441:21, 466:13, 497:20, 503:6, 504:8, 504:21, 519:17, 520:4</p> <p>Associates [2] - 415:7, 415:16</p> <p>Association [1] - 337:5</p> <p>assume [14] - 357:17, 357:21, 359:24, 360:7, 368:21, 399:4, 400:4, 400:10, 423:21, 424:11, 499:24, 545:6, 548:2, 550:23</p>	<p>assuming [9] - 358:6, 359:17, 390:12, 407:8, 407:9, 440:14, 443:7, 486:15, 547:24</p> <p>assumption [3] - 359:13, 407:19, 526:24</p> <p>assumptions [7] - 357:7, 357:11, 359:12, 360:13, 399:18, 419:13, 420:2</p> <p>assurance [4] - 554:2, 554:4, 566:2, 582:19</p> <p>assure [1] - 583:2</p> <p>assures [1] - 412:18</p> <p>asterisk [2] - 471:4, 471:14</p> <p>Asthma [1] - 337:17</p> <p>atmosphere [2] - 360:18, 386:21</p> <p>atmospheric [2] - 357:8, 357:21</p> <p>attach [1] - 538:11</p> <p>attached [7] - 474:22, 474:25, 545:19, 554:6, 558:22, 560:20, 585:11</p> <p>Attachment [39] - 333:14, 333:15, 333:15, 333:16, 333:16, 333:17, 334:7, 334:8, 334:8, 334:9, 334:12, 334:12, 334:13, 334:13, 334:14, 334:14, 334:15, 334:15, 334:16, 334:16, 334:17, 334:17, 334:18, 334:18, 334:19, 334:20, 334:20, 336:7, 336:7, 336:8, 336:11, 336:13, 336:13, 338:20, 338:20, 338:21, 338:21, 338:23, 338:23</p> <p>attachment [1] - 538:13</p> <p>attachments [1] - 556:13</p> <p>attain [1] - 413:20</p> <p>Attainments [1] - 337:9</p> <p>attempt [5] - 510:11, 523:20, 523:21, 523:23, 524:3</p> <p>attempted [4] -</p>
---	--	---	---	---

500:15, 501:18, 507:9, 523:19 attended [1] - 498:1 attention [2] - 350:22, 444:10 attenuation [4] - 357:7, 357:8, 357:23, 427:20 attic [1] - 449:5 Attitude [1] - 337:5 attitude [3] - 456:16, 457:13, 471:13 attitudes [2] - 434:8, 436:25 attorney [3] - 379:8, 379:10, 482:13 Attorney [2] - 402:3, 497:3 attorneys [1] - 512:4 attract [1] - 505:11 attraction [1] - 535:12 attributed [1] - 456:13 atypical [1] - 417:20 auctioneer [1] - 354:20 audibility [2] - 464:24, 483:4 audible [5] - 452:23, 453:11, 453:13, 454:14, 471:12 Audible [1] - 335:12 audience [1] - 469:23 Australia [1] - 435:3 Australian [3] - 337:11, 338:3, 479:12 author [5] - 417:11, 425:7, 439:10, 459:14, 466:23 authored [2] - 475:7, 480:5 authority [2] - 519:13, 570:8 authors [1] - 514:7 autism [6] - 444:6, 444:13, 444:18, 446:23, 446:25, 449:13 availability [1] - 400:5 available [15] - 379:22, 394:18, 394:24, 395:3, 408:19, 425:9, 446:6, 459:13, 479:15, 480:20, 495:3, 502:11, 506:5, 575:23, 580:22 Avenue [1] - 329:3 average [7] - 468:12, 468:14, 468:22, 468:25, 469:2, 469:11, 469:14 avian [8] - 516:22, 517:14, 517:17, 522:11, 522:15, 534:22, 534:24, 535:15 Avian [2] - 333:6, 515:16 aviation [3] - 534:15, 534:17, 537:24 avoid [10] - 411:20, 501:6, 501:15, 501:25, 502:12, 519:9, 521:4, 524:3, 524:13, 543:13 avoidance [3] - 506:17, 520:25, 521:18 avoided [2] - 521:8, 521:15 avoiding [1] - 506:16 aware [29] - 345:19, 361:11, 379:10, 420:24, 421:2, 423:16, 505:19, 505:23, 505:25, 506:19, 506:21, 506:25, 507:4, 507:5, 508:11, 508:14, 512:23, 516:21, 516:25, 533:12, 542:13, 560:5, 567:25, 568:5, 568:21, 568:24, 568:25, 572:14, 574:23 aye [3] - 584:19, 584:21, 584:22		BAKER [1] - 330:8 Bakker [1] - 489:22 balance [1] - 490:20 balked [1] - 413:15 base [2] - 433:21, 537:2 Base [1] - 336:5 based [47] - 335:12, 358:19, 360:24, 383:19, 393:24, 401:12, 405:6, 405:20, 408:9, 409:14, 417:8, 433:14, 435:1, 442:14, 444:24, 445:22, 446:5, 447:6, 459:12, 460:2, 460:3, 467:15, 472:2, 475:10, 475:24, 476:3, 480:20, 493:18, 497:18, 501:3, 509:20, 515:23, 518:4, 518:20, 524:15, 524:25, 528:11, 539:11, 546:6, 554:21, 554:24, 557:10, 561:18, 563:20, 567:4, 573:17 baseline [9] - 387:9, 416:21, 478:13, 478:23, 479:3, 479:9, 479:22 basins [3] - 501:10, 503:5, 521:6 basis [4] - 511:7, 511:13, 544:19, 555:1 Bat [3] - 333:7, 333:7, 334:4 batch [1] - 542:8 Bates [3] - 404:17, 404:18 Baucom [1] - 328:16 bear [5] - 372:5, 526:17, 526:18, 526:21, 526:22 beauties [1] - 447:22 become [3] - 419:10, 422:21, 442:7 becomes [1] - 533:16 Bedrock [1] - 336:20 BEFORE [1] - 328:11 Before-After [1] - 335:10 began [2] - 450:12, 461:8 beginning [1] - 500:14	behalf [6] - 328:19, 328:21, 328:22, 374:3, 544:9, 569:19 behind [7] - 347:15, 369:22, 370:13, 371:19, 372:1, 484:20 beings [2] - 425:18, 426:3 believes [1] - 353:2 below [8] - 361:7, 365:16, 381:1, 383:17, 454:17, 454:24, 457:19, 581:11 belts [1] - 387:16 beneficial [1] - 508:3 benefit [8] - 363:11, 436:4, 437:1, 437:3, 437:5, 437:9, 457:17, 516:1 benefited [5] - 440:12, 441:2, 441:4, 441:5, 441:8 benefits [1] - 434:9 best [23] - 419:7, 420:16, 424:13, 446:5, 462:24, 463:7, 463:12, 463:25, 464:19, 480:22, 482:22, 482:24, 488:5, 502:6, 509:23, 513:17, 515:10, 517:11, 548:11, 549:16, 553:8, 562:8, 569:3 bet [1] - 581:17 better [11] - 388:25, 440:15, 442:15, 444:5, 498:13, 510:8, 510:19, 522:7, 522:19, 522:20, 523:8 between [8] - 391:24, 430:1, 472:18, 484:3, 484:9, 517:12, 517:16, 580:4 Between [2] - 337:5, 339:14 beyond [6] - 358:17, 362:20, 405:24, 406:3, 463:24, 525:21 Biased [1] - 337:18 big [2] - 412:16, 448:5 Bill [5] - 554:19, 555:6, 556:4, 564:23, 565:14	bill [1] - 565:4 binder [1] - 477:17 bio [1] - 384:24 biologist [4] - 498:9, 504:17, 509:14, 529:17 biology [2] - 450:23, 528:13 bird [7] - 503:2, 503:8, 514:10, 516:6, 518:4, 518:6, 535:15 Bird [1] - 334:3 birds [13] - 502:8, 504:16, 507:8, 507:21, 509:8, 514:4, 519:5, 522:13, 522:14, 522:21, 530:8, 533:19, 535:1 bit [19] - 344:8, 348:22, 372:19, 386:3, 395:16, 419:23, 422:7, 426:18, 441:14, 448:1, 455:6, 461:19, 505:7, 514:15, 517:12, 522:11, 527:24, 553:11, 555:15 black [2] - 526:17, 526:18 Black [1] - 495:10 blade [2] - 484:2, 484:9 blades [1] - 359:4 blank [1] - 530:8 blessing [1] - 516:2 blinded [2] - 456:7, 476:24 block [1] - 369:15 blockage [2] - 359:23, 400:3 blood [11] - 436:10, 441:20, 442:21, 442:22, 442:24, 443:5, 443:8, 443:9, 443:12, 443:21, 453:11 blowing [3] - 359:25, 360:2, 400:6 blown [1] - 564:1 blowup [1] - 367:25 board [3] - 345:24, 346:3, 390:20 Board [1] - 338:24 body [1] - 437:18 Book [1] - 339:11 book [2] - 486:9, 486:10 border [2] - 546:20,
--	--	--	---	--

546:21 bosses [1] - 550:7 Boston [3] - 432:13, 433:4, 444:15 bottom [5] - 368:1, 396:14, 404:18, 475:18, 480:18 boundaries [4] - 376:11, 376:18, 377:1, 406:6 boundary [8] - 405:6, 405:7, 405:12, 405:16, 405:22, 407:9, 547:15, 547:16 brackets [2] - 488:9, 488:10 break [4] - 392:15, 393:5, 540:19, 571:24 breeding [1] - 504:9 BREF [1] - 337:8 Brian [1] - 328:19 brief [5] - 352:5, 352:13, 417:15, 435:18, 572:7 briefly [8] - 401:25, 447:11, 455:19, 497:15, 497:24, 541:11, 543:7, 552:19 briefs [1] - 583:8 Brigham [1] - 432:13 bring [5] - 442:8, 505:12, 524:9, 549:24, 559:25 broach [1] - 485:16 broad [2] - 425:19, 435:13 Brooks [1] - 526:17 brought [6] - 350:22, 397:8, 448:2, 521:16, 522:23, 561:21 Brown [1] - 340:11 buffer [3] - 521:19, 522:1, 527:19 Buhl [3] - 514:7, 518:15, 538:12 build [2] - 463:17, 473:25 building [7] - 359:16, 359:17, 397:1, 397:4, 397:10, 397:16, 501:15 buildings [1] - 400:3 built [2] - 421:3, 508:24 bullet [11] - 460:17, 463:1, 463:16, 472:16, 472:17, 473:2, 473:19, 481:9, 481:10, 481:20, 482:4 bullets [3] - 480:11, 481:10, 481:18 bunch [1] - 549:25 business [9] - 342:24, 343:1, 343:3, 347:16, 406:25, 415:3, 432:10, 450:5, 484:23 buy [1] - 565:4 buying [1] - 564:18 BY [26] - 328:4, 342:23, 372:16, 375:16, 402:2, 404:15, 415:2, 418:11, 431:9, 432:9, 436:2, 447:13, 450:4, 458:15, 483:21, 497:2, 512:2, 513:14, 538:9, 541:2, 544:6, 550:14, 551:6, 552:12, 557:21, 572:9	<div>C</div> C-1 [2] - 339:18, 577:24 C-2 [2] - 339:18, 577:25 C-3 [8] - 339:11, 375:25, 376:2, 377:11, 377:12, 383:21, 383:23, 384:2 C-61 [1] - 380:21 Calculated [1] - 335:19 calculations [3] - 378:18, 390:9, 390:17 campaign [1] - 389:8 Canada [24] - 337:4, 437:7, 437:20, 437:23, 441:15, 441:25, 446:7, 446:8, 450:25, 453:3, 456:3, 456:15, 457:3, 459:7, 465:15, 466:23, 467:7, 474:6, 474:9, 477:14, 479:10, 487:7, 536:7 Canadian [3] - 461:22, 462:1, 463:5 cancer [1] - 445:6 candidly [2] - 453:14, 454:7 cannot [5] - 350:10, 521:8, 526:22, 551:14, 560:3 Canons [1] - 340:19 capable [1] - 443:25 capacities [1] - 497:12 capacity [1] - 343:23 Capitol [3] - 329:3, 342:11 caption [1] - 472:4 capture [2] - 411:16, 411:23 captured [1] - 409:16 captures [2] - 411:17, 488:25 card [1] - 347:16 cardiac [1] - 444:8 care [2] - 361:17, 496:19 career [5] - 355:12, 355:17, 447:24, 448:3, 504:14 carry [1] - 535:11 cascading [1] - 490:22 Case [1] - 337:18 case [27] - 342:16, 359:6, 361:3, 380:25, 392:5, 398:25, 399:5, 400:4, 401:11, 406:15, 428:23, 428:24, 428:25, 432:17, 433:15, 436:15, 463:24, 464:13, 474:20, 477:23, 488:19, 492:19, 494:8, 498:17, 513:16, 571:18, 574:9 Case-Control [1] - 337:18 cases [8] - 387:7, 387:10, 391:14, 398:8, 409:24, 440:4, 505:10, 519:22 cast [3] - 359:19, 360:17, 484:9 casting [2] - 360:4, 360:8 casts [1] - 400:12 catch [1] - 567:11 categorical [2] - 446:1, 446:2 Cattle [6] - 516:16, 516:17, 516:24, 517:13, 539:18, 539:19 caught [1] - 530:5 caused [1] - 533:19 causes [1] - 443:4 causing [2] - 488:24, 492:6 cautioned [1] - 477:9 CDC [1] - 453:4 ceased [1] - 351:22 Cedar [4] - 459:6, 462:2, 462:6, 462:23 cell [2] - 518:2, 530:22 center [2] - 343:13, 433:1 centering [1] - 523:16 central [1] - 504:4 century [1] - 350:9 certain [9] - 411:8, 428:2, 462:24, 463:7, 465:24, 466:9, 474:25, 554:6, 580:2 certainly [43] - 344:21, 352:2, 352:19, 366:12, 386:5, 392:13, 394:15, 398:16, 401:7, 401:16, 401:18, 407:7, 420:16, 441:12, 443:23, 447:16, 448:21, 450:21, 454:17, 464:2, 465:18, 465:20, 466:1, 466:8, 466:11, 469:24, 474:3, 474:24, 476:1, 482:1, 484:18, 497:17, 504:5, 505:1, 518:20, 525:2, 529:7, 529:8, 530:1, 532:18, 563:4, 564:22, 564:24 certainty [2] - 489:9, 489:14 CERTIFICATE [1] - 585:2 Certified [2] - 585:6, 585:19 CERTIFY [1] - 585:8 cetera [3] - 386:7, 395:10, 436:11 CHAIRMAN [94] - 328:11, 328:12, 353:7, 353:21, 354:1, 354:10, 355:8, 373:25, 384:21, 384:23, 385:13, 385:17, 386:1, 386:17, 387:13, 388:1, 388:16, 389:4, 389:9, 389:25, 422:2, 422:5, 422:11, 422:14, 422:17, 422:23, 423:14, 423:18, 423:24, 424:3, 424:6, 424:22, 425:15, 426:1, 426:6, 426:8, 439:20, 439:22, 439:24, 440:2, 440:11, 440:19, 442:2, 442:21, 443:4, 443:13, 443:19, 445:10, 446:11, 467:24, 485:12, 485:15, 485:24, 486:4, 487:10, 490:24, 491:4, 491:18, 492:8, 492:23, 496:10, 496:21, 518:11, 518:14, 519:11, 520:14, 522:10, 523:15, 525:4, 526:8, 549:8, 549:11, 549:18, 549:21, 549:24, 550:11, 567:9, 567:14, 567:20, 567:25, 568:4, 568:13, 569:3, 569:6, 569:9, 569:17, 570:11, 574:18, 581:12, 583:24, 584:15, 584:17, 584:20, 584:22 Chairman [12] - 372:17, 384:20, 422:1, 485:11, 485:14, 496:18, 496:24, 518:10, 567:8, 570:20, 571:19, 583:18 challenge [7] - 388:16, 412:16, 420:21, 448:22, 486:14, 489:18, 536:9 challenged [1] - 346:11 challenges [6] - 445:21, 492:2, 492:5, 524:6, 535:21, 536:17
--	---

<p>challenging [1] - 521:4</p> <p>change [10] - 362:9, 362:15, 364:18, 370:13, 370:19, 386:6, 456:18, 456:20, 550:23, 550:24</p> <p>changed [6] - 361:24, 365:17, 473:15, 474:13, 557:8, 582:13</p> <p>changes [25] - 355:22, 355:25, 356:13, 356:15, 356:16, 356:22, 365:18, 366:1, 376:25, 379:19, 383:17, 386:4, 386:5, 390:25, 391:2, 410:7, 414:4, 416:13, 433:9, 452:4, 452:11, 464:7, 498:24, 529:13, 550:17</p> <p>changing [2] - 386:12, 550:20</p> <p>chateau [2] - 502:18, 502:19</p> <p>chatted [1] - 423:19</p> <p>check [5] - 347:24, 374:12, 379:17, 407:15, 582:21</p> <p>checked [3] - 367:10, 393:21, 499:11</p> <p>checking [1] - 551:16</p> <p>chemical [1] - 432:21</p> <p>CHERI [1] - 585:5</p> <p>Cheri [3] - 328:24, 585:17, 585:18</p> <p>Cheri's [1] - 537:20</p> <p>Chicago [1] - 433:2</p> <p>chick [1] - 527:16</p> <p>chicken [6] - 504:19, 504:22, 505:2, 527:15, 535:22, 536:2</p> <p>chickens [3] - 503:14, 530:15, 535:8</p> <p>chief [4] - 497:7, 497:13, 497:17</p> <p>childhood [1] - 445:21</p> <p>children [3] - 444:12, 444:23, 448:20</p> <p>Children [1] - 337:10</p> <p>children's [1] - 444:14</p> <p>choice [1] - 348:1</p> <p>cholesterol [1] - 436:10</p> <p>chose [1] - 491:2</p>	<p>Chris [1] - 337:4</p> <p>CHRIS [1] - 328:12</p> <p>CHRISTENSON [1] - 545:4</p> <p>Christenson [2] - 334:11, 391:2</p> <p>CHRISTOPHER [1] - 331:22</p> <p>Christopher [3] - 335:6, 335:6, 450:7</p> <p>chronic [1] - 486:11</p> <p>cigarette [2] - 436:11, 445:5</p> <p>circled [1] - 382:21</p> <p>circling [1] - 382:7</p> <p>circumstances [2] - 406:18, 521:24</p> <p>cited [2] - 461:21, 514:1</p> <p>citizens [1] - 569:23</p> <p>City [1] - 337:15</p> <p>civil [2] - 370:23, 370:24</p> <p>claim [2] - 367:24, 388:17</p> <p>claiming [1] - 578:18</p> <p>clarification [3] - 378:5, 486:25, 512:6</p> <p>clarified [1] - 437:13</p> <p>clarify [5] - 372:23, 407:19, 462:8, 564:8, 566:23</p> <p>class [1] - 536:19</p> <p>classification [2] - 434:15, 434:20</p> <p>Classification [1] - 339:8</p> <p>Classroom [1] - 337:9</p> <p>clear [6] - 348:23, 373:14, 376:12, 382:25, 412:22, 482:12</p> <p>cleared [1] - 548:16</p> <p>clearly [4] - 349:19, 351:15, 448:24, 492:16</p> <p>cliche [1] - 446:4</p> <p>client [2] - 369:9, 371:8</p> <p>clients [5] - 350:21, 377:20, 393:22, 559:24, 580:17</p> <p>clinical [1] - 449:1</p> <p>Clinical [1] - 337:20</p> <p>clinician [1] - 444:16</p> <p>close [21] - 342:8, 344:8, 411:3, 420:4, 431:15, 440:17, 453:7, 453:14, 453:22, 456:5,</p>	<p>457:5, 467:8, 467:11, 471:17, 471:22, 491:24, 492:4, 492:7, 513:4, 522:4, 534:6</p> <p>closely [1] - 543:10</p> <p>closer [4] - 426:19, 426:25, 453:16, 523:6</p> <p>closest [2] - 429:17, 458:1</p> <p>closing [4] - 372:7, 516:19, 517:12, 575:9</p> <p>cloudy [1] - 359:10</p> <p>co [5] - 417:11, 425:7, 465:16, 469:16, 475:7</p> <p>co-author [2] - 417:11, 425:7</p> <p>co-authored [1] - 475:7</p> <p>co-leader [1] - 469:16</p> <p>co-presenter [1] - 465:16</p> <p>coauthored [2] - 459:14, 475:6</p> <p>code [2] - 350:9, 434:19</p> <p>coded [1] - 434:13</p> <p>coding [1] - 367:4</p> <p>CODINGTON [1] - 328:5</p> <p>Codington [25] - 358:9, 358:16, 358:20, 358:21, 373:10, 373:18, 375:2, 375:9, 376:10, 376:17, 377:1, 401:6, 401:14, 404:22, 404:25, 405:3, 405:4, 405:11, 407:10, 461:12, 503:11, 515:18, 553:19, 554:2, 566:8</p> <p>Codington's [1] - 358:17</p> <p>Cohort [1] - 337:19</p> <p>coincide [1] - 519:7</p> <p>cold [3] - 575:20, 577:21, 582:18</p> <p>Cold [1] - 339:17</p> <p>coldest [1] - 575:19</p> <p>colleague [2] - 578:11, 578:17</p> <p>colleagues [1] - 463:3</p> <p>collect [2] - 421:20, 523:7</p> <p>collected [2] - 526:1,</p>	<p>531:13</p> <p>collecting [2] - 531:14, 532:9</p> <p>collection [3] - 416:21, 542:8, 576:23</p> <p>collective [2] - 511:11, 533:25</p> <p>college [2] - 415:17, 450:25</p> <p>color [3] - 367:4, 409:21, 566:10</p> <p>column [6] - 367:9, 475:14, 478:6, 480:14, 480:19, 481:1</p> <p>columns [2] - 384:6, 488:2</p> <p>combination [1] - 421:13</p> <p>comfortable [4] - 410:3, 556:2, 567:3, 571:4</p> <p>coming [7] - 375:4, 387:17, 414:3, 426:10, 437:12, 439:1, 449:20</p> <p>commandments [1] - 519:19</p> <p>commencing [1] - 329:4</p> <p>comment [6] - 415:10, 417:5, 437:10, 496:6, 555:9, 582:11</p> <p>commented [1] - 543:16</p> <p>commenting [4] - 462:21, 476:2, 476:5, 485:4</p> <p>Comments [1] - 333:22</p> <p>comments [6] - 344:23, 446:2, 476:3, 479:20, 495:6, 495:24</p> <p>commercial [2] - 416:2, 448:3</p> <p>Commission [63] - 339:3, 339:7, 340:10, 350:11, 350:20, 352:1, 352:23, 353:1, 353:5, 354:25, 355:4, 369:19, 370:2, 371:15, 375:4, 375:19, 378:8, 384:3, 398:17, 404:12, 408:7, 431:4, 431:10, 437:16,</p>	<p>447:6, 450:13, 451:14, 457:20, 460:17, 469:6, 469:21, 479:6, 479:7, 479:16, 485:9, 497:4, 508:13, 518:9, 532:19, 540:1, 548:14, 552:16, 553:25, 554:8, 554:23, 555:2, 555:5, 555:13, 555:23, 557:9, 558:6, 559:19, 563:20, 565:17, 566:6, 566:25, 568:17, 570:6, 570:8, 571:12, 572:11, 574:25, 583:9</p> <p>COMMISSION [3] - 328:1, 328:11, 328:13</p> <p>commission [1] - 437:17</p> <p>Commission's [4] - 554:16, 567:4, 574:23, 582:5</p> <p>commission's [1] - 556:1</p> <p>commissioned [1] - 565:18</p> <p>Commissioner [71] - 330:5, 330:10, 330:15, 330:20, 331:5, 331:9, 331:13, 331:17, 331:20, 331:24, 332:5, 332:9, 332:13, 392:20, 394:22, 395:10, 401:16, 404:7, 407:9, 409:24, 410:17, 422:1, 438:23, 438:25, 440:5, 485:9, 487:5, 491:9, 491:21, 492:11, 493:14, 493:18, 518:13, 518:18, 519:21, 520:20, 522:17, 523:10, 523:25, 525:10, 526:10, 526:11, 526:20, 527:10, 528:22, 529:2, 529:4, 529:15, 530:4, 530:22, 530:24, 531:1, 531:11, 532:22, 532:23,</p>
---	--	---	---	--

533:6, 534:10, 534:20, 536:24, 537:1, 537:6, 537:7, 548:15, 548:19, 562:13, 563:3, 567:9, 570:12, 584:18, 584:20 COMMISSIONER ^[119] - 328:12, 355:7, 355:9, 390:2, 390:4, 390:15, 390:21, 390:24, 391:18, 391:21, 391:25, 392:7, 392:13, 392:25, 393:9, 393:13, 394:4, 394:6, 394:21, 395:4, 395:20, 396:2, 396:6, 396:9, 396:12, 396:17, 396:21, 396:24, 397:11, 397:14, 397:18, 398:11, 398:15, 399:10, 399:17, 399:24, 400:1, 400:9, 400:19, 400:24, 401:3, 401:5, 401:15, 407:8, 407:18, 408:20, 409:7, 410:6, 410:18, 412:20, 413:12, 414:1, 426:9, 427:3, 427:5, 428:5, 428:10, 428:17, 428:20, 430:3, 430:8, 430:10, 430:15, 430:18, 438:24, 439:1, 439:4, 439:7, 439:14, 439:18, 446:15, 447:2, 483:13, 493:15, 496:9, 496:11, 526:11, 526:16, 527:1, 528:16, 529:1, 529:3, 529:22, 530:14, 530:19, 532:16, 532:23, 534:3, 534:11, 534:12, 536:18, 536:25, 537:19, 548:16, 548:20, 549:1, 549:7, 562:14, 562:25, 564:7, 564:21, 565:8, 565:20, 566:13, 567:6, 567:13, 570:20, 571:13, 571:18, 581:9,	581:16, 582:10, 582:18, 582:25, 583:5, 584:9, 584:16, 584:19, 584:21 Commissioners ^[21] - 384:19, 406:8, 414:7, 450:22, 452:16, 468:6, 471:11, 477:14, 483:11, 489:17, 494:1, 496:8, 523:3, 529:24, 538:11, 538:15, 565:11, 566:16, 569:22, 581:7, 584:8 Commissioners' ^[2] - 394:9, 394:16 commissions ^[4] - 451:16, 461:13, 464:6, 468:16 committee ^[3] - 343:16, 385:1, 385:19 common ^[9] - 354:3, 411:9, 453:20, 479:4, 484:1, 488:20, 501:4, 501:24, 506:13 commonly ^[2] - 406:10, 516:23 commonplace ^[1] - 460:7 communicate ^[2] - 562:6, 568:8 communicating ^[2] - 560:9, 560:14 communication ^[3] - 505:18, 559:23, 562:5 Communication ^[1] - 334:5 communications ^[1] - 568:11 communities ^[1] - 473:6 community ^[26] - 460:12, 460:13, 460:23, 461:1, 463:15, 463:16, 464:1, 464:4, 464:11, 464:16, 464:17, 472:19, 472:24, 473:1, 473:8, 473:22, 474:3, 474:16, 474:18, 481:17, 481:22, 481:23, 482:4, 522:19 company ^[18] -	342:24, 343:2, 343:20, 367:19, 368:11, 368:20, 369:2, 369:18, 415:3, 432:11, 450:5, 537:16, 543:10, 554:5, 554:11, 557:3, 579:23, 581:13 compare ^[3] - 417:16, 418:24, 425:10 compared ^[9] - 377:13, 385:23, 385:24, 417:3, 417:20, 425:4, 425:14, 429:2, 491:12 comparing ^[2] - 405:15, 406:9 comparison ^[4] - 376:1, 377:6, 406:5, 534:7 compatible ^[1] - 458:24 compelled ^[1] - 568:18 competency ^[1] - 351:4 competent ^[1] - 351:16 compiled ^[1] - 350:8 complain ^[3] - 441:10, 457:10, 471:23 complaint ^[3] - 394:2, 457:1, 482:3 complaints ^[3] - 456:22, 456:23, 471:17 Complaints ^[2] - 337:11, 338:3 complete ^[3] - 517:9, 549:15, 563:24 Completed ^[1] - 338:9 completed ^[6] - 423:10, 478:18, 513:21, 542:15, 542:17, 549:13 completely ^[2] - 446:1, 521:25 completes ^[1] - 434:18 completion ^[1] - 517:14 complexities ^[1] - 535:21 compliance ^[15] - 358:11, 358:20, 358:22, 388:5, 406:22, 407:10, 407:13, 407:15,	409:20, 419:13, 429:8, 429:13, 429:19, 431:20, 541:10 complicated ^[2] - 436:13, 509:10 complies ^[2] - 382:5, 429:17 compliment ^[1] - 558:15 comply ^[4] - 362:20, 571:1, 571:7, 571:15 component ^[4] - 418:23, 505:2, 520:10, 520:11 compounding ^[1] - 533:11 comprehensive ^[5] - 453:2, 456:2, 466:19, 534:16, 563:15 comprehensively ^[1] - 534:19 computer ^[2] - 395:1, 402:19 computers ^[1] - 370:17 concedes ^[1] - 580:16 concentrations ^[1] - 501:8 concept ^[1] - 509:2 concern ^[15] - 425:25, 431:19, 452:21, 468:9, 477:25, 516:15, 520:19, 522:15, 526:4, 553:14, 553:17, 554:9, 578:8, 579:14, 579:16 concerned ^[15] - 372:18, 374:5, 376:17, 379:13, 379:14, 388:2, 408:13, 431:10, 431:12, 446:1, 449:2, 454:22, 491:5, 491:7, 543:19 concerning ^[2] - 517:8, 560:15 concerns ^[24] - 424:16, 433:16, 442:22, 451:8, 501:1, 501:16, 515:13, 542:3, 543:5, 543:17, 543:19, 551:1, 553:25, 561:11, 567:14, 568:3, 570:12, 572:19, 572:20, 572:25,	573:1, 573:3, 578:13, 580:17 conclude ^[4] - 441:4, 460:6, 476:18, 478:11 concluded ^[1] - 454:14 concludes ^[3] - 366:5, 435:18, 583:20 conclusion ^[8] - 433:21, 435:14, 440:21, 460:1, 478:8, 486:23, 560:11, 565:9 conclusions ^[11] - 385:10, 435:1, 440:22, 459:10, 459:12, 459:16, 477:7, 478:11, 480:11, 533:18, 583:16 conclusive ^[5] - 507:19, 507:25, 512:23, 513:5, 514:15 conclusively ^[1] - 438:19 concrete ^[1] - 542:8 condition ^[35] - 408:13, 408:15, 408:21, 409:17, 420:6, 420:11, 423:7, 449:9, 454:22, 464:17, 508:12, 508:23, 531:1, 531:4, 536:22, 537:2, 537:8, 537:11, 538:4, 543:3, 556:3, 556:5, 556:19, 557:10, 562:19, 563:2, 563:8, 565:5, 566:1, 566:6, 567:18, 570:25, 571:5, 577:17 Condition ^[2] - 339:15, 340:7 Conditional ^[1] - 333:9 conditions ^[31] - 343:19, 357:21, 408:24, 410:23, 411:8, 411:18, 412:11, 413:4, 415:11, 417:6, 417:24, 424:13, 449:13, 469:18, 520:7, 555:22, 557:3, 558:1, 558:5, 558:11, 558:19,
--	--	---	---	---

558:21, 559:1, 559:18, 559:25, 560:15, 573:5, 573:15, 580:4, 580:25 Conditions [2] - 336:4, 339:14 conductive [1] - 510:2 conduct [3] - 415:23, 464:1, 517:17 conducted [17] - 409:20, 412:23, 416:1, 416:4, 435:13, 436:20, 438:3, 451:10, 453:3, 454:12, 476:25, 510:1, 513:23, 514:6, 514:23, 516:6, 517:1 conducting [1] - 533:7 conference [2] - 465:19, 469:20 confidence [1] - 419:12 confidential [8] - 575:16, 575:18, 577:19, 578:1, 578:18, 578:19, 578:20, 578:21 Confidential [13] - 333:15, 333:15, 333:16, 333:16, 334:7, 336:7, 336:13, 336:24, 338:22, 339:16, 339:16, 339:19, 340:6 confines [1] - 362:3 confirm [4] - 346:21, 403:22, 544:22, 575:9 confirmed [1] - 526:21 confuse [2] - 354:7, 373:24 confused [2] - 363:19, 401:7 confusing [1] - 354:5 connected [1] - 410:13 conscious [1] - 353:11 Consent [1] - 337:21 consented [1] - 377:20 conservation [1] - 522:19 Conservation [1] - 334:4 conservatism [3] - 390:11, 399:14, 	430:1 conservative [17] - 357:12, 357:16, 357:20, 358:3, 359:12, 359:21, 390:7, 398:1, 398:5, 398:9, 398:12, 399:11, 399:12, 399:18, 427:13, 427:14, 427:20 consider [7] - 352:23, 369:19, 389:1, 447:19, 500:9, 504:1, 563:20 considerable [2] - 370:20, 559:17 Consideration [1] - 337:3 consideration [10] - 378:13, 501:5, 512:18, 518:3, 520:12, 523:1, 528:1, 528:15, 533:22, 541:13 considerations [3] - 508:8, 519:2, 522:9 considered [2] - 521:13, 560:1 Considered [1] - 335:20 considering [6] - 352:24, 386:23, 389:17, 517:3, 555:2, 566:12 consisted [1] - 517:5 consistent [5] - 409:13, 455:13, 461:20, 555:19, 570:6 consistently [1] - 347:8 constituents [1] - 401:18 constitutes [1] - 466:20 constraint [1] - 394:7 Constraints [2] - 336:18, 336:18 constraints [2] - 379:3, 379:22 constrictive [1] - 401:8 constructed [3] - 500:12, 521:3, 562:22 Construction [1] - 334:6 construction [16] - 417:14, 418:20, 423:22, 424:13, 	424:15, 438:5, 445:1, 506:12, 506:18, 506:20, 507:12, 520:11, 521:20, 525:9, 550:16, 550:18 consult [2] - 473:1, 519:15 consultant [7] - 385:24, 420:15, 432:16, 451:2, 451:19, 548:7 consultants [2] - 427:19, 547:23 consultation [24] - 444:19, 460:13, 460:23, 461:1, 463:16, 463:22, 464:1, 464:2, 464:17, 472:14, 472:15, 472:20, 472:23, 473:4, 473:9, 473:18, 474:2, 474:17, 481:17, 481:23, 482:5, 498:11, 499:16, 526:3 consultations [2] - 461:3, 520:8 consulted [1] - 558:16 consulting [1] - 516:21 consumer [1] - 371:24 consuming [1] - 535:5 contact [2] - 567:22, 568:19 contacting [1] - 505:25 contained [2] - 369:8, 371:7 contains [1] - 370:12 contaminated [1] - 451:7 contamination [1] - 412:17 contents [1] - 582:4 Context [1] - 337:22 context [5] - 436:18, 471:7, 481:10, 481:19, 534:24 contiguous [2] - 502:5, 502:8 contingent [1] - 539:5 continually [1] - 442:5 continuation [1] - 545:25 continue [4] - 351:22, 524:8, 524:22, 530:10 Continued [11] - 	331:1, 332:1, 333:1, 334:1, 335:1, 336:1, 337:1, 338:1, 339:1, 340:1, 341:1 continues [2] - 518:24, 562:5 continuing [1] - 344:7 contour [1] - 359:11 contours [1] - 357:7 contract [1] - 371:24 contributed [1] - 380:22 contributions [3] - 358:7, 389:21, 429:11 control [2] - 416:7, 534:5 Control [5] - 337:18, 338:10, 339:4, 339:6, 340:19 controverting [1] - 492:9 conversation [2] - 345:23, 566:14 conversations [5] - 499:16, 510:16, 515:11, 524:9, 526:5 conversely [1] - 441:7 conversion [1] - 552:24 Cooperative [1] - 340:10 Coordination [1] - 333:4 coordinator [1] - 541:10 copies [2] - 364:25, 365:3 copy [5] - 346:20, 352:6, 368:2, 420:7, 420:8 corner [2] - 504:1, 504:4 correct [101] - 345:1, 345:3, 345:10, 345:16, 348:8, 353:25, 366:4, 367:21, 368:13, 368:23, 369:4, 369:9, 373:3, 373:12, 375:21, 376:16, 376:20, 377:5, 377:7, 377:16, 379:6, 380:2, 380:4, 380:8, 380:14, 381:21, 383:18, 390:7, 390:10, 397:17, 398:13, 400:23, 402:13, 402:14, 	404:23, 405:5, 10 405:7, 405:8, 407:12, 412:13, 413:1, 413:2, 418:13, 418:14, 421:22, 428:8, 428:9, 439:5, 458:24, 460:4, 463:8, 463:9, 465:8, 469:25, 472:22, 474:23, 475:25, 476:14, 478:9, 478:10, 480:9, 480:23, 481:2, 481:15, 494:12, 494:13, 494:19, 496:19, 498:14, 498:15, 500:2, 504:11, 506:24, 508:22, 509:2, 512:9, 512:10, 512:22, 513:1, 514:5, 515:4, 515:21, 515:24, 515:25, 534:9, 534:10, 539:14, 539:15, 545:20, 556:19, 556:20, 558:3, 559:20, 559:21, 561:14, 561:17, 561:18, 576:9, 576:25, 577:6, 585:11 correction [4] - 350:24, 376:7, 556:15, 557:1 corrections [9] - 355:22, 356:13, 356:22, 416:13, 433:9, 452:4, 452:11, 542:11, 556:24 correctly [5] - 368:6, 429:16, 430:4, 514:20, 582:6 Correspondence [1] - 333:4 Corridor [1] - 333:24 cortisol [2] - 441:19, 453:11 Coteau [7] - 501:13, 502:21, 502:25, 503:4, 504:7, 524:13 counsel [14] - 363:8, 363:15, 364:8, 377:17, 377:18, 377:23, 378:1, 395:5, 458:21, 546:18, 560:4, 576:11, 578:6,
---	--	---	---	--

578:23 counselor [2] - 473:17, 484:7 Counties [2] - 401:6, 553:19 counties [23] - 362:20, 373:10, 373:11, 375:1, 375:2, 401:11, 421:2, 450:14, 455:14, 463:19, 464:8, 469:7, 473:6, 553:23, 554:1, 554:10, 554:17, 565:17, 566:1, 566:5, 566:24, 567:3, 570:13 COUNTIES [1] - 328:5 Counties' [2] - 570:14, 570:16 counting [2] - 360:15, 399:22 country [5] - 514:25, 527:14, 527:18, 528:3, 528:19 counts [1] - 535:2 COUNTY [1] - 585:3 county [17] - 362:4, 362:19, 374:4, 374:7, 416:23, 417:19, 423:6, 431:13, 451:15, 453:18, 455:12, 457:15, 461:13, 461:14, 464:6, 468:16 County [32] - 333:9, 340:11, 357:24, 358:9, 358:11, 358:15, 358:16, 358:21, 362:21, 373:18, 376:17, 401:14, 404:22, 407:11, 454:1, 461:11, 461:12, 503:11, 515:19, 547:25, 554:2, 554:4, 565:10, 566:8, 571:2, 571:8, 571:16 County's [2] - 358:20, 358:22 county's [1] - 555:25 couple [20] - 342:5, 351:13, 353:7, 354:14, 360:13, 372:6, 385:2, 476:19, 479:5, 489:21, 489:25, 497:11, 499:17,	502:17, 507:11, 512:5, 513:4, 546:16, 553:13, 562:18 course [12] - 349:22, 363:1, 369:13, 444:9, 451:1, 468:13, 468:22, 469:11, 485:23, 499:23, 523:20, 550:3 court [8] - 342:21, 414:24, 432:7, 450:2, 517:23, 540:24, 552:10, 561:3 courtesies [1] - 583:23 courtship [1] - 505:9 cover [3] - 372:23, 372:24, 385:25 Cover [8] - 341:5, 341:6, 341:6, 341:7, 341:8, 341:9, 341:10, 341:11 coverage [2] - 530:22, 579:15 covered [1] - 356:2 covers [1] - 551:9 CR [3] - 402:12, 402:15, 403:7 CR1-C106P [1] - 396:3 CR1C10-P [1] - 401:1 crane [1] - 542:7 Crane [1] - 333:24 create [3] - 443:6, 445:19, 484:16 creates [2] - 417:2, 443:20 credentials [2] - 344:19, 351:23 credibility [3] - 351:4, 352:22, 354:12 credit [2] - 359:22, 400:2 CREMER [159] - 342:1, 344:21, 348:20, 349:8, 349:11, 351:9, 352:9, 352:12, 353:4, 354:24, 355:10, 363:7, 363:18, 363:22, 365:6, 366:9, 366:12, 370:10, 370:22, 371:3, 372:4, 372:13, 375:13, 378:5, 381:4, 381:6, 382:1, 383:24, 384:18, 392:14,	392:17, 392:19, 401:24, 403:19, 403:22, 403:24, 404:2, 404:6, 404:10, 407:4, 407:7, 407:23, 407:25, 408:2, 408:6, 408:16, 410:8, 410:14, 414:6, 414:11, 414:13, 414:17, 414:21, 418:4, 418:7, 421:25, 430:24, 431:2, 431:6, 431:23, 432:1, 432:5, 435:21, 435:24, 438:22, 438:25, 447:3, 447:5, 447:9, 449:18, 449:20, 449:24, 458:11, 468:3, 482:15, 482:18, 482:21, 483:8, 483:11, 483:15, 483:18, 485:8, 493:14, 493:16, 493:18, 493:21, 493:23, 494:3, 494:5, 494:9, 494:14, 494:21, 495:4, 495:17, 495:23, 496:2, 496:5, 496:8, 496:14, 496:25, 499:10, 511:21, 513:10, 518:8, 538:7, 538:18, 539:24, 540:4, 540:8, 540:11, 540:17, 540:19, 540:21, 543:23, 544:2, 546:12, 548:13, 548:19, 550:12, 551:3, 551:23, 551:25, 552:3, 552:7, 555:8, 555:13, 557:15, 557:18, 560:24, 562:12, 571:22, 572:1, 572:4, 574:2, 574:5, 574:8, 574:12, 574:14, 574:17, 574:19, 575:5, 576:7, 576:10, 577:3, 577:8, 578:4, 579:10, 579:13, 579:25, 580:8, 580:11, 581:1, 581:6, 581:14, 581:23, 582:1,	582:15, 582:17, 583:6 Cremer [5] - 328:14, 410:14, 511:19, 566:17, 583:25 criteria [14] - 358:11, 413:5, 425:4, 425:5, 425:9, 425:14, 440:23, 554:5, 554:6, 554:11, 555:24, 571:8 Criterion [1] - 340:13 Critical [1] - 335:15 critical [1] - 486:5 Crocker [1] - 554:7 Cross [23] - 330:4, 330:5, 330:9, 330:10, 330:14, 330:15, 330:19, 330:19, 331:4, 331:5, 331:8, 331:9, 331:12, 331:12, 331:16, 331:20, 331:23, 331:24, 332:4, 332:5, 332:8, 332:12, 336:20 cross [8] - 372:12, 384:17, 418:3, 435:20, 458:10, 511:20, 543:22, 557:14 CROSS [10] - 372:15, 375:15, 418:10, 436:1, 458:14, 483:20, 512:1, 513:13, 544:5, 557:20 Cross-Examination [22] - 330:4, 330:5, 330:9, 330:10, 330:14, 330:15, 330:19, 330:19, 331:4, 331:5, 331:8, 331:9, 331:12, 331:12, 331:16, 331:20, 331:23, 331:24, 332:4, 332:5, 332:8, 332:12 cross-examination [6] - 372:12, 384:17, 418:3, 435:20, 458:10, 511:20 CROSS- EXAMINATION [10] - 372:15, 375:15, 418:10, 436:1, 458:14, 483:20, 512:1, 513:13, 544:5, 557:20 Cross-sections [1] -	336:20 11 CROWNED [1] - 328:4 crowned [2] - 457:14, 548:1 Crowned [75] - 328:19, 333:3, 335:3, 336:9, 338:12, 338:13, 338:14, 338:15, 338:16, 338:19, 338:22, 339:14, 339:17, 342:3, 342:16, 343:5, 361:21, 361:22, 367:2, 370:10, 372:9, 373:19, 377:9, 380:3, 380:9, 380:25, 403:3, 405:23, 408:7, 409:21, 414:8, 414:21, 415:8, 416:20, 420:24, 430:24, 432:15, 433:17, 449:24, 450:11, 450:12, 452:19, 453:25, 455:12, 460:24, 461:9, 461:10, 479:24, 494:6, 495:23, 499:13, 499:25, 500:15, 506:19, 511:22, 512:4, 537:21, 538:1, 539:8, 540:1, 540:2, 543:24, 551:7, 553:13, 555:8, 557:16, 563:5, 563:11, 563:23, 564:19, 564:20, 566:7, 574:3, 574:19, 580:4 CRR [1] - 328:24 CRW [3] - 342:17, 433:22, 520:14 cue [3] - 456:16, 457:13, 471:13 cultural [5] - 541:13, 543:12, 545:7, 548:22, 583:1 cumulative [5] - 362:7, 380:15, 510:20, 510:23, 553:12 curiosities [1] - 424:9 curious [4] - 385:7, 424:3, 424:7, 426:6 current [3] - 381:16, 397:5, 509:13 curriculum [1] - 499:2 Curriculum [2] -
---	--	---	--	---

337:16, 338:7 curtail [1] - 361:15 curve [1] - 359:5 CV [2] - 335:6, 439:12 cwittler@venturecomm.net [1] - 328:25 cycle [2] - 505:4, 505:13	508:4, 511:11, 523:8, 526:1, 528:9, 531:15, 537:14, 564:3 date [6] - 425:8, 461:5, 465:17, 516:19, 517:13 Dated [1] - 585:13 dated [2] - 459:21, 545:23 Dates [1] - 333:4 dates [2] - 517:20, 518:3 dating [1] - 455:15 Dave [1] - 557:22 David [8] - 328:20, 338:24, 339:3, 340:3, 340:16, 415:11, 513:15, 544:9 DAVID [1] - 330:3 days [9] - 359:9, 468:14, 509:24, 510:3, 529:14, 559:16, 561:15, 577:1 dB [2] - 437:25, 438:1 dBA [35] - 421:8, 425:17, 426:14, 429:5, 430:11, 445:12, 452:24, 454:15, 460:14, 460:22, 461:16, 462:3, 463:13, 464:21, 466:15, 467:15, 469:17, 470:3, 470:10, 472:11, 472:18, 472:21, 473:11, 474:15, 475:9, 475:19, 476:19, 481:7, 481:14, 481:21, 482:7, 483:1, 486:24, 487:1 dBAs [1] - 431:11 dBs [1] - 421:5 de [1] - 328:15 deal [1] - 527:3 dealing [3] - 376:9, 401:17, 452:22 debate [3] - 470:25, 471:9, 471:12 debris [1] - 502:20 decent [1] - 557:24 decibel [13] - 390:6, 429:5, 429:22, 430:9, 430:13, 431:17, 457:1, 469:4, 469:7, 469:12, 473:21,	474:11, 481:12 decibels [46] - 357:14, 358:10, 358:12, 358:13, 388:10, 389:22, 390:13, 390:19, 398:10, 425:22, 426:2, 429:10, 429:13, 435:17, 438:15, 452:24, 453:12, 453:19, 453:23, 454:2, 456:6, 457:11, 457:19, 458:5, 462:9, 462:12, 463:23, 466:2, 467:8, 467:9, 467:12, 468:10, 468:17, 468:18, 474:1, 474:4, 476:2, 476:3, 477:2, 477:3, 488:2, 488:3, 490:17, 492:7, 492:15, 492:21 decide [1] - 564:12 decided [1] - 344:9 decides [1] - 566:17 deciding [1] - 369:20 decision [7] - 353:11, 520:10, 529:25, 538:4, 554:7, 566:16, 583:10 decisions [8] - 446:5, 448:8, 451:16, 479:6, 520:7, 520:11, 526:7, 567:4 decommissioning [27] - 423:6, 423:11, 423:12, 424:12, 553:19, 553:22, 554:1, 554:11, 554:13, 554:15, 554:21, 554:23, 555:3, 555:15, 555:22, 556:5, 564:13, 564:25, 566:6, 566:9, 566:25, 567:1, 567:2, 567:18, 570:15, 570:17, 571:11 Decommissioning [2] - 333:10, 334:6 deeper [1] - 570:22 defer [2] - 554:1, 567:2 define [1] - 440:7 defined [1] - 541:14 definitely [1] - 425:23 definitive [2] - 426:19, 523:11	degree [6] - 419:11, 432:21, 432:22, 432:24, 498:2, 515:4 degrees [1] - 360:16 delineation [1] - 547:10 delta [1] - 421:11 demonstrate [2] - 362:17, 435:5 demonstrated [1] - 429:19 demonstrates [1] - 438:19 denied [1] - 350:19 Denmark [1] - 435:3 Dennis [1] - 338:18 densities [1] - 514:4 department [4] - 444:20, 485:21, 499:14, 539:12 Department [3] - 451:20, 497:19, 505:15 dependent [6] - 502:8, 503:17, 519:5, 530:7, 533:20, 534:25 depth [1] - 549:4 deputy [1] - 497:7 derive [1] - 437:8 derived [1] - 529:18 describe [4] - 344:2, 354:4, 481:11, 582:3 described [7] - 346:6, 355:5, 431:19, 472:13, 517:18, 521:16, 557:25 describing [2] - 471:17, 517:2 description [1] - 501:3 deserves [1] - 355:1 Design [2] - 334:6, 340:16 design [5] - 343:23, 343:25, 344:10, 354:7, 406:21 designated [1] - 534:18 designation [1] - 486:2 designed [4] - 429:7, 429:8, 435:8, 436:14 desires [1] - 570:14 detail [1] - 448:6 detailed [2] - 454:19, 478:19 detect [2] - 454:17, 536:3 detectable [1] - 434:24	determination [3] - 352:17, 352:20, 537:3 determinations [1] - 534:2 determine [14] - 388:5, 429:16, 436:8, 436:14, 436:21, 498:5, 507:11, 514:11, 515:12, 532:4, 532:9, 533:2, 533:15, 535:14 determined [6] - 399:13, 509:7, 519:4, 519:5, 533:1, 537:13 determining [3] - 510:24, 533:18, 537:17 detriment [1] - 445:12 Deuel [3] - 409:14, 461:10, 461:12 develop [4] - 437:1, 437:4, 473:8, 523:4 developed [4] - 355:17, 419:3, 433:22, 510:21 developer [9] - 394:15, 417:3, 473:7, 505:18, 506:4, 525:12, 526:5, 537:16, 566:3 developers [8] - 398:8, 427:10, 427:16, 451:18, 501:5, 508:25, 510:15, 519:15 developing [3] - 343:17, 385:19, 528:15 development [13] - 419:2, 462:24, 463:8, 506:18, 507:14, 510:6, 511:13, 518:22, 519:1, 523:5, 523:13, 524:6, 570:5 developmental [1] - 508:10 Developments [1] - 340:17 developments [3] - 416:3, 439:9, 480:23 devise [2] - 525:12, 526:6 diabetes [1] - 436:10 diagnoses [1] - 447:1 diagnosis [2] - 434:14, 446:23
---	---	---	--	---

Diagnosis ^[1] - 337:17 diagnostic ^[1] - 434:16 dialogue ^[2] - 499:22, 561:22 difference ^[13] - 391:23, 393:6, 393:7, 407:16, 429:9, 430:1, 448:11, 456:7, 469:4, 471:24, 487:17, 491:14, 519:23 differences ^[3] - 409:4, 427:17, 492:5 Different ^[1] - 338:6 different ^[54] - 354:18, 377:2, 396:15, 400:17, 409:2, 420:18, 424:17, 425:4, 427:21, 440:22, 442:9, 443:10, 443:11, 443:14, 445:15, 447:14, 447:15, 447:17, 467:10, 484:7, 488:18, 499:18, 499:25, 500:7, 502:3, 511:10, 513:1, 513:2, 515:6, 518:21, 520:1, 522:14, 524:19, 527:14, 527:18, 527:19, 527:24, 529:13, 534:16, 534:23, 535:1, 535:3, 535:20, 535:21, 542:19, 547:10, 547:15, 549:14, 554:11, 560:12, 564:24, 584:3 differentiate ^[1] - 435:12 differently ^[2] - 445:16, 505:7 difficult ^[4] - 379:4, 411:16, 518:2, 521:4 difficulty ^[1] - 367:24 diffusion ^[1] - 360:18 diligence ^[1] - 563:5 direct ^[9] - 342:16, 379:24, 395:20, 395:22, 448:9, 464:23, 482:13, 483:3, 494:8 Direct ^[34] - 330:4, 330:9, 330:14, 330:18, 331:4,	331:8, 331:11, 331:16, 331:19, 331:23, 332:4, 332:8, 332:12, 333:11, 333:11, 333:12, 333:12, 336:5, 340:3, 340:4, 340:4, 340:5, 344:12, 355:19, 355:23, 395:18, 483:22, 489:25, 498:16, 498:23, 499:9, 538:10, 558:23, 569:13 DIRECT ^[7] - 342:22, 415:1, 432:8, 450:3, 497:1, 541:1, 552:11 directed ^[1] - 545:16 direction ^[7] - 359:7, 359:19, 359:20, 398:10, 400:16, 569:24, 570:8 directions ^[1] - 400:17 directly ^[3] - 360:5, 360:8, 484:20 director ^[4] - 343:10, 444:14, 444:20, 497:7 disadvantage ^[1] - 388:19 disagree ^[4] - 386:20, 477:6, 559:3, 569:14 disagreement ^[1] - 422:8 disappointed ^[1] - 580:19 disbursement ^[1] - 519:6 disclaimer ^[8] - 368:15, 369:17, 369:21, 370:12, 370:18, 370:23, 371:4, 393:15 disclaimers ^[1] - 370:15 discovery ^[7] - 559:2, 561:9, 561:12, 561:17, 573:2, 573:15, 573:17 discuss ^[4] - 475:19, 486:19, 567:22, 581:8 discussed ^[10] - 349:23, 362:24, 466:4, 469:3, 514:17, 515:14, 520:24, 522:11, 522:14, 537:8 discussing ^[8] - 469:18, 473:20,	476:12, 480:10, 480:25, 481:4, 482:7, 559:25 Discussion ^[6] - 395:17, 439:3, 474:8, 483:17, 538:6, 570:10 discussion ^[9] - 386:3, 426:11, 523:2, 523:16, 527:12, 531:16, 532:11, 533:17, 571:11 discussions ^[18] - 386:8, 444:14, 450:13, 477:4, 499:20, 499:22, 510:15, 510:22, 511:12, 519:22, 522:9, 523:18, 558:17, 568:20, 568:21, 568:22, 568:25, 571:13 disease ^[2] - 436:8, 436:16 Disease ^[1] - 337:13 Disease' ^[1] - 338:4 diseases ^[3] - 434:15, 434:21, 448:1 disorder ^[1] - 486:11 dispersal ^[1] - 514:12 displacement ^[3] - 514:12, 519:6, 527:22 display ^[1] - 505:6 displayed ^[1] - 363:25 displaying ^[3] - 505:8, 505:11, 535:10 dispute ^[2] - 368:16, 368:18 disqualifies ^[1] - 371:1 disqualify ^[1] - 353:1 distance ^[13] - 393:3, 426:21, 460:3, 509:17, 513:3, 513:6, 527:5, 528:6, 528:11, 532:13, 533:20, 535:11, 535:25 distance-based ^[1] - 460:3 distances ^[5] - 393:7, 514:12, 514:13, 527:18, 528:23 Distress ^[1] - 335:10 distribute ^[1] - 368:1 distributed ^[3] - 368:4, 538:21, 575:22	Distribution ^[2] - 337:12, 338:4 distribution ^[1] - 503:22 distributions ^[1] - 359:8 disturbance ^[18] - 425:22, 425:24, 426:3, 435:16, 441:22, 466:6, 466:20, 476:14, 476:18, 486:19, 487:25, 488:6, 488:14, 488:16, 488:18, 492:13, 527:22, 531:3 Disturbance ^[1] - 335:9 disturbances ^[3] - 466:14, 488:25, 492:16 disturbed ^[3] - 488:7, 490:2, 524:20 Division ^[1] - 497:7 DK-3 ^[1] - 573:16 DK-8 ^[4] - 558:24, 560:19, 573:13, 573:14 DO ^[1] - 585:8 Docket ^[3] - 339:5, 339:7, 342:3 docket ^[8] - 394:8, 529:5, 541:16, 552:25, 556:8, 572:15, 573:7, 573:20 dockets ^[7] - 413:15, 549:2, 567:5, 568:5, 571:1, 572:10, 572:23 doctor ^[1] - 446:11 doctoral ^[1] - 485:22 doctorate ^[1] - 486:2 doctors ^[1] - 447:14 document ^[21] - 353:13, 364:13, 368:5, 369:2, 369:8, 371:1, 371:7, 381:9, 381:10, 382:23, 438:12, 467:21, 468:7, 470:6, 487:15, 538:21, 545:19, 575:18, 578:7, 578:12, 578:19 Documentation ^[1] - 336:24 documented ^[3] - 537:10, 537:13, 543:12	documents ^[12] - 347:7, 349:19, 368:4, 370:14, 370:18, 395:8, 432:16, 433:14, 458:20, 458:24, 516:1, 575:16 dollar ^[1] - 474:7 done ^[56] - 345:22, 351:3, 378:20, 378:22, 379:1, 381:25, 387:11, 387:15, 393:17, 393:19, 394:2, 406:14, 407:1, 418:20, 419:9, 419:13, 421:15, 425:21, 429:16, 429:24, 456:10, 464:2, 468:22, 469:1, 470:1, 473:9, 474:5, 474:9, 476:13, 476:17, 477:9, 477:11, 477:12, 477:15, 477:19, 479:11, 479:13, 495:21, 498:17, 505:24, 511:3, 514:2, 515:5, 515:16, 515:18, 516:12, 526:2, 527:14, 537:20, 538:1, 548:22, 550:25, 555:23, 563:5, 563:9, 583:7 door ^[2] - 342:13, 523:22 doors ^[1] - 342:11 dose ^[1] - 445:3 dots ^[1] - 576:21 double ^[1] - 565:18 down ^[25] - 360:2, 374:19, 382:12, 399:9, 405:1, 407:25, 414:18, 419:23, 432:1, 471:4, 472:17, 486:21, 488:8, 488:23, 492:20, 493:24, 531:6, 531:20, 537:24, 540:12, 542:9, 552:4, 572:14, 572:15, 574:10 downplay ^[1] - 456:17 downwind ^[1] - 357:18 DR ^[13] - 331:18, 331:22, 333:14, 333:15, 333:15,
--	---	---	---	--

333:16, 333:16, 333:17, 336:22, 336:25, 340:3, 340:6, 340:24 Dr [17] - 337:16, 432:6, 432:12, 436:3, 450:1, 450:7, 453:1, 455:20, 455:21, 456:11, 458:16, 466:21, 466:25, 475:7, 476:16, 476:22, 489:18 DR's [10] - 333:14, 334:7, 334:10, 334:11, 336:6, 336:8, 336:11, 336:12, 338:19, 338:22 draft [3] - 556:22, 557:2, 558:5 drafted [3] - 508:11, 556:23, 563:19 draw [1] - 507:2 drawing [3] - 344:9, 368:13, 530:8 drawings [1] - 345:21 Drexel [1] - 432:22 drinking [1] - 449:6 drive [3] - 448:4, 456:21, 507:1 driven [3] - 419:25, 456:16, 457:13 driver [1] - 554:18 drivers [1] - 448:4 driving [1] - 456:11 drop [4] - 347:19, 353:20, 376:14, 491:16 dropped [6] - 345:25, 373:7, 381:1, 383:6, 390:25, 397:5 dropping [4] - 365:24, 378:12, 378:14, 391:7 Drops [1] - 339:10 drops [10] - 363:24, 366:2, 376:1, 376:22, 376:23, 377:9, 377:13, 380:24, 407:14 drove [1] - 572:18 drowning [1] - 389:23 due [8] - 356:15, 365:18, 379:3, 379:21, 383:17, 483:3, 563:5, 583:14 duly [1] - 585:8 duly-appointed [1] - 585:8 duplication [1] -	364:13 durations [1] - 424:14 during [25] - 411:22, 411:25, 412:9, 415:21, 417:13, 423:6, 423:7, 423:11, 423:17, 450:14, 451:22, 468:18, 506:17, 506:20, 508:16, 508:17, 509:19, 521:20, 525:9, 537:16, 550:17, 555:21, 557:2, 559:23, 576:19 duties [3] - 497:15, 498:4, 552:19 E e-mail [3] - 545:13, 545:16, 545:19 e-mails [1] - 370:16 EAPC [8] - 333:17, 333:18, 333:19, 333:20, 343:3, 343:4, 343:13, 367:19 early [6] - 419:3, 476:15, 476:22, 499:20, 510:2, 531:25 earned [1] - 415:18 ease [2] - 367:22, 367:23 easier [4] - 354:8, 398:16, 409:6, 533:16 easily [3] - 389:22, 411:10, 546:14 East [1] - 329:3 east [1] - 455:7 eastern [2] - 503:20, 503:23 easy [1] - 574:18 economic [6] - 434:9, 436:4, 437:1, 437:3, 437:4, 437:9 economically [5] - 440:12, 441:2, 441:3, 441:5, 441:8 education [9] - 343:8, 344:7, 352:16, 353:3, 415:14, 432:19, 450:19, 499:5, 504:12 educational [1] - 497:24 EDWARDS [32] - 352:7, 436:2,	438:21, 447:11, 447:13, 449:16, 540:23, 541:2, 542:21, 543:21, 550:14, 551:2, 552:2, 552:9, 552:12, 555:4, 557:12, 560:10, 560:18, 571:24, 572:2, 572:6, 572:9, 573:25, 574:13, 574:16, 576:6, 579:14, 579:24, 580:6, 581:3, 582:16 Edwards [14] - 328:22, 330:10, 330:12, 330:19, 330:21, 331:5, 331:6, 331:9, 331:20, 331:21, 332:8, 332:9, 332:12, 332:13 EERC [1] - 343:12 Effect [3] - 333:9, 337:21, 337:22 effect [22] - 351:3, 351:4, 380:16, 425:18, 426:2, 434:13, 434:22, 442:24, 443:1, 443:3, 443:6, 444:2, 444:22, 448:25, 483:3, 484:12, 484:14, 486:5, 487:2, 493:2, 507:3 effective [1] - 525:15 effects [24] - 380:19, 424:24, 435:5, 435:15, 436:4, 437:24, 438:9, 438:18, 442:3, 442:6, 443:14, 446:10, 448:19, 451:9, 462:5, 462:18, 464:23, 470:13, 471:3, 471:16, 475:5, 478:12, 490:22, 498:6 Effects [7] - 333:23, 335:7, 335:8, 335:11, 335:18, 337:9, 340:14 efficacy [1] - 370:5 efficient [2] - 525:15, 554:15 effort [3] - 510:4, 511:8, 549:19 efforts [4] - 500:23, 502:11, 525:18, 537:17	eight [5] - 428:22, 428:25, 430:4, 454:7, 477:10 either [15] - 354:22, 361:14, 375:18, 392:5, 414:6, 416:4, 416:5, 420:4, 422:12, 424:20, 449:2, 449:12, 489:19, 568:2, 584:7 Eja [3] - 476:15, 477:11, 489:23 EL18-026 [1] - 340:18 EL19-003 [2] - 328:4, 342:3 elaborate [1] - 387:24 elected [2] - 344:6, 344:11 electric [1] - 531:1 electronic [1] - 578:25 element [1] - 505:13 elevation [2] - 357:6, 359:11 elevations [1] - 443:8 eleventh [3] - 378:23, 395:9, 529:9 Elicit [1] - 336:3 eliminate [1] - 351:23 elsewhere [2] - 482:8, 528:19 emission [4] - 357:6, 357:15, 388:5, 390:19 Emissions [4] - 335:21, 335:22, 338:8, 340:12 emissions [8] - 388:3, 460:13, 460:21, 463:13, 472:11, 474:15, 481:7, 481:21 emitting [1] - 390:13 empathize [1] - 353:21 employed [1] - 497:9 EN [1] - 337:3 end [9] - 342:9, 352:20, 358:6, 360:12, 366:24, 499:1, 516:12, 562:4, 564:10 end-all [1] - 352:20 endangered [1] - 497:21 ended [7] - 380:21, 383:15, 383:17, 468:4, 562:7, 565:3, 571:6 ENERGY [1] - 328:5 energy [11] - 343:4,	343:12, 343:18, 1 4 385:14, 385:22, 415:20, 415:25, 434:8, 552:24, 564:18, 565:7 Energy [3] - 334:4, 337:24, 564:15 Energy's [4] - 333:17, 333:18, 333:19, 333:20 engage [1] - 448:7 engaged [1] - 450:13 engagement [1] - 473:22 engineer [27] - 343:2, 343:12, 344:4, 344:25, 345:6, 345:13, 346:7, 346:15, 346:23, 347:5, 347:10, 347:14, 347:22, 348:8, 348:10, 348:17, 349:4, 350:2, 350:7, 351:20, 352:22, 353:24, 354:6, 354:8, 354:16, 373:3, 375:6 engineer's [1] - 347:4 engineering [2] - 343:10, 432:21 Engineering [4] - 338:10, 339:4, 339:6, 340:19 engineers [2] - 343:3, 343:24 English [1] - 335:23 enjoy [1] - 581:12 enlightenment [1] - 518:17 ensure [7] - 390:6, 413:8, 460:8, 467:13, 486:7, 541:12, 565:17 ensuring [1] - 489:3 entails [1] - 541:11 entire [5] - 404:24, 447:24, 537:11, 549:16, 564:2 entirely [1] - 473:20 entities [1] - 385:5 entitled [5] - 329:2, 410:22, 475:5, 480:5, 585:10 entrance [1] - 355:5 entrenched [1] - 584:11 entries [2] - 405:3, 405:4 Entry [1] - 336:11
---	--	--	---	--

Environment ^[1] - 337:9 environment ^[3] - 456:19, 456:20, 498:6 environmental ^[24] - 343:13, 415:19, 432:23, 433:3, 438:2, 445:2, 447:25, 450:8, 450:9, 450:10, 450:24, 451:1, 465:13, 465:24, 466:8, 485:20, 485:23, 489:13, 498:8, 515:19, 529:17, 533:4 Environmental ^[2] - 333:22, 336:18 epidemiology ^[1] - 437:23 Epilepsy ^[2] - 335:24, 335:25 epilepsy ^[10] - 447:19, 447:21, 448:2, 448:5, 448:6, 448:10, 448:11, 449:13, 454:21, 455:1 epileptics ^[1] - 454:22 Epsilon ^[2] - 415:6, 415:16 equipment ^[1] - 424:20 equivalent ^[3] - 453:4, 469:6, 469:13 erect ^[1] - 423:22 erecting ^[1] - 423:25 Eric ^[1] - 574:16 escrow ^[7] - 554:6, 555:17, 555:25, 565:24, 570:25, 571:9, 571:15 especially ^[4] - 428:11, 430:20, 442:12, 466:14 essence ^[1] - 449:7 essentially ^[5] - 451:5, 453:4, 473:2, 553:15, 576:20 establish ^[5] - 348:16, 349:13, 352:16, 354:11, 570:24 established ^[5] - 348:15, 349:4, 349:12, 351:11, 351:15 Establishment ^[2] - 337:12, 338:3 estimate ^[6] - 355:13,	355:17, 389:18, 418:16, 418:18, 509:23 estimated ^[2] - 383:18, 486:10 Estimating ^[1] - 335:18 et ^[3] - 386:7, 395:10, 436:11 Ethics ^[1] - 340:19 Europe ^[3] - 467:21, 468:7, 476:25 evaluate ^[6] - 429:7, 429:8, 446:24, 448:3, 448:23, 448:24 evaluated ^[5] - 439:14, 439:15, 446:21, 446:23, 524:2 evaluating ^[2] - 416:23, 449:8 Evaluation ^[2] - 335:21, 335:22 evaluation ^[3] - 416:24, 434:18, 518:6 evaluations ^[1] - 416:8 eventually ^[1] - 579:7 evidence ^[16] - 344:15, 351:5, 355:5, 355:6, 370:9, 442:10, 452:17, 459:13, 494:16, 494:17, 507:25, 513:5, 557:11, 559:8, 559:10, 559:13 Evidence ^[2] - 336:5, 337:18 evidentiary ^[6] - 394:23, 562:3, 562:4, 562:7, 568:12, 575:10 Evidentiary ^[1] - 340:18 evolved ^[1] - 571:10 Ex ^[2] - 341:11, 341:12 Ex.-Clean ^[1] - 339:5 exact ^[6] - 355:15, 380:19, 392:22, 461:5, 465:17, 544:23 exactly ^[6] - 361:13, 372:18, 399:13, 465:19, 470:7, 480:9 exam ^[1] - 347:4 Examination ^[53] - 330:4, 330:4, 330:5, 330:6, 330:9, 330:9,	330:10, 330:11, 330:11, 330:12, 330:14, 330:14, 330:15, 330:16, 330:16, 330:18, 330:19, 330:19, 330:20, 330:21, 330:21, 331:4, 331:4, 331:5, 331:6, 331:8, 331:8, 331:9, 331:11, 331:12, 331:12, 331:13, 331:14, 331:16, 331:16, 331:17, 331:19, 331:20, 331:21, 331:23, 331:23, 331:24, 332:4, 332:4, 332:5, 332:6, 332:8, 332:8, 332:9, 332:10, 332:12, 332:12, 332:13 EXAMINATION ^[25] - 342:22, 372:15, 375:15, 402:1, 404:14, 415:1, 418:10, 431:8, 432:8, 436:1, 447:12, 450:3, 458:14, 483:20, 497:1, 512:1, 513:13, 538:8, 541:1, 544:5, 550:13, 551:5, 552:11, 557:20, 572:8 examination ^[6] - 372:12, 384:17, 418:3, 435:20, 458:10, 511:20 examine ^[1] - 518:16 Examiner ^[8] - 352:18, 371:4, 381:5, 482:13, 499:8, 578:3, 583:21, 583:24 example ^[12] - 429:14, 436:7, 441:19, 444:6, 448:2, 455:5, 463:18, 463:21, 500:9, 501:7, 525:12, 536:5 examples ^[3] - 398:2, 398:3, 429:1 exceed ^[3] - 428:3, 429:15, 468:18 exceeding ^[1] - 457:15 excellent ^[3] - 468:7, 476:24, 477:11	except ^[2] - 567:17, 576:18 exception ^[1] - 361:7 excluded ^[1] - 490:9 excuse ^[7] - 344:3, 344:14, 363:8, 363:13, 373:25, 377:17, 568:14 excused ^[9] - 408:1, 414:20, 432:4, 449:23, 494:2, 540:13, 540:18, 552:6, 574:11 Exhibit ^[75] - 334:23, 335:3, 335:4, 335:6, 335:7, 335:8, 335:9, 335:10, 335:12, 335:13, 335:14, 335:15, 335:16, 335:17, 335:18, 335:20, 335:22, 335:23, 335:24, 336:3, 336:4, 339:3, 340:22, 340:22, 340:23, 344:13, 355:20, 356:4, 356:10, 356:18, 363:23, 363:25, 364:3, 364:4, 364:22, 366:3, 366:17, 366:18, 375:20, 381:8, 390:22, 404:16, 416:10, 420:6, 426:12, 475:2, 480:4, 498:19, 541:21, 542:22, 544:11, 544:13, 545:11, 546:13, 546:19, 547:12, 547:16, 547:20, 547:21, 548:10, 553:3, 556:6, 556:16, 558:24, 560:19, 573:13, 577:16, 577:19, 577:20, 577:23, 577:24, 577:25, 579:15, 580:10 exhibit ^[28] - 363:15, 364:17, 364:20, 365:8, 365:15, 365:20, 365:21, 367:3, 368:1, 368:7, 377:10, 381:23, 383:25, 395:25, 396:8, 402:4, 402:8, 410:21, 465:3, 476:8, 556:17, 577:11, 577:14,	578:1, 578:7, 578:13, 581:24, 582:4 exhibits ^[27] - 344:12, 349:20, 350:13, 355:19, 355:23, 356:11, 356:19, 362:8, 362:14, 363:8, 363:12, 364:25, 370:8, 372:10, 395:21, 396:10, 403:16, 416:11, 416:14, 433:10, 452:5, 452:12, 495:8, 495:12, 575:7, 575:25, 581:8 EXHIBITS ^[10] - 333:2, 334:2, 335:2, 336:2, 337:2, 338:2, 339:2, 340:2, 340:9, 341:2 Exhibits ^[12] - 333:13, 340:3, 340:4, 340:4, 340:5, 356:6, 362:11, 366:6, 403:14, 433:6, 452:1, 452:8 exist ^[2] - 379:2, 508:6 existence ^[1] - 379:5 expand ^[1] - 525:18 expands ^[1] - 410:24 expansions ^[1] - 503:18 expect ^[6] - 350:11, 419:12, 422:6, 426:24, 489:15, 525:11 expensive ^[1] - 509:11 experience ^[28] - 343:9, 351:23, 352:15, 352:16, 353:2, 370:13, 374:18, 374:22, 374:24, 387:4, 388:11, 411:9, 415:15, 415:25, 426:17, 432:20, 433:23, 445:19, 445:23, 450:20, 453:15, 473:8, 489:15, 499:5, 504:20, 504:23, 509:15, 583:1 experiences ^[2] - 442:9, 534:21 experimentally ^[1] - 435:8 expert ^[7] - 352:17, 353:1, 418:13, 420:13, 425:20,
---	---	---	--	---

<p>439:4 Expert ^[1] - 338:8 expert's ^[1] - 409:15 expertise ^[3] - 370:20, 447:15, 447:20 experts ^[1] - 579:23 expire ^[3] - 344:11, 348:1, 348:3 explain ^[10] - 390:8, 391:6, 397:2, 398:20, 411:5, 414:3, 495:7, 541:11, 541:25, 552:19 explained ^[3] - 399:13, 493:3, 495:10 explains ^[1] - 470:7 explanation ^[3] - 412:21, 413:13, 441:14 explore ^[1] - 569:9 exposed ^[1] - 449:4 exposure ^[7] - 435:6, 445:4, 448:23, 449:3, 449:8, 449:10, 469:12 Exposure ^[3] - 335:17, 335:20, 337:18 expounds ^[1] - 410:24 expressed ^[1] - 570:12 extend ^[1] - 411:20 extensive ^[1] - 509:14 extent ^[4] - 502:1, 519:9, 524:22, 570:4 exterior ^[3] - 453:23, 454:2, 468:13 extraordinary ^[2] - 369:24, 371:21 extreme ^[2] - 575:20, 577:21 Extreme ^[1] - 339:17 extremely ^[5] - 486:8, 486:19, 503:25, 521:3, 537:4</p>	<p>facility ^[2] - 371:13, 425:12 FACILITY ^[1] - 328:5 facing ^[5] - 360:3, 360:5, 360:8, 400:11, 400:16 Fact ^[1] - 336:12 fact ^[36] - 346:17, 347:3, 352:21, 356:3, 367:12, 367:15, 369:20, 370:11, 370:19, 373:6, 374:22, 374:23, 393:10, 397:4, 397:10, 400:4, 407:13, 434:6, 434:17, 437:6, 442:3, 453:22, 461:3, 461:19, 462:25, 464:5, 477:8, 478:16, 488:18, 490:9, 492:14, 503:9, 514:4, 530:7, 572:15 factor ^[14] - 360:14, 360:20, 360:23, 399:7, 400:15, 400:17, 427:20, 427:21, 427:25, 434:7, 436:21, 440:9, 465:25, 466:9 Factor ^[1] - 337:18 Factors ^[1] - 337:23 factors ^[10] - 433:21, 434:3, 436:9, 436:14, 436:24, 440:6, 440:9, 456:8, 533:11, 533:18 factually ^[1] - 469:25 failed ^[1] - 557:4 fair ^[16] - 368:23, 380:6, 383:5, 412:18, 447:14, 500:1, 500:18, 500:22, 501:19, 501:20, 508:18, 508:19, 509:1, 560:23, 580:16 fairly ^[4] - 383:14, 499:4, 503:20, 504:6 faith ^[1] - 562:6 fall ^[1] - 424:12 falls ^[2] - 498:7, 528:7 falsehood ^[1] - 351:2 familiar ^[15] - 381:9, 381:10, 381:13, 419:15, 419:16, 422:21, 498:16, 499:2, 506:7,</p>	<p>518:15, 543:3, 553:18, 556:17, 556:21, 560:7 families ^[1] - 550:4 family ^[1] - 436:10 fancy ^[1] - 467:4 far ^[19] - 374:9, 409:14, 410:10, 426:21, 441:18, 453:7, 454:15, 457:4, 471:22, 488:13, 491:13, 492:4, 527:5, 528:18, 543:19, 549:19, 567:25, 568:5, 575:25 Farm ^[3] - 338:12, 338:13, 340:11 farm ^[21] - 342:4, 354:7, 367:2, 371:13, 380:4, 400:4, 406:21, 459:6, 473:25, 484:17, 498:5, 510:6, 511:5, 511:17, 512:5, 518:22, 519:14, 524:7, 548:2, 552:21, 561:25 farmers ^[1] - 491:6 farms ^[22] - 343:19, 343:23, 343:25, 344:11, 362:5, 362:7, 379:25, 389:13, 421:3, 439:15, 490:5, 510:12, 510:16, 510:21, 514:8, 519:20, 522:5, 523:4, 527:13, 551:12, 554:21 Farms ^[6] - 335:14, 337:12, 338:3, 338:9, 340:12, 340:13 fast ^[1] - 454:24 favor ^[1] - 561:4 favorable ^[1] - 357:22 feasible ^[1] - 479:9 February ^[2] - 356:4, 356:7 federal ^[2] - 541:12, 541:14 feedback ^[1] - 394:3 feelings ^[1] - 489:1 feet ^[13] - 357:25, 358:1, 398:2, 425:13, 453:7, 453:19, 455:4, 455:8, 456:6, 457:5,</p>	<p>462:12, 492:15 fellow ^[1] - 584:7 fellowship ^[1] - 433:2 felt ^[1] - 573:23 females ^[3] - 505:11, 505:12, 535:12 few ^[15] - 353:17, 399:25, 410:9, 410:16, 413:7, 418:9, 419:1, 421:9, 491:16, 495:4, 513:18, 524:5, 529:14, 544:10, 553:6 fewer ^[1] - 536:15 Fiegen ^[15] - 404:7, 407:9, 427:6, 438:25, 485:9, 529:4, 529:15, 530:4, 531:11, 534:20, 548:19, 562:13, 570:12, 584:20, 584:21 FIEGEN ^[75] - 328:12, 355:9, 394:6, 394:21, 395:4, 395:20, 396:2, 396:6, 396:9, 396:12, 396:17, 396:21, 396:24, 397:11, 397:14, 397:18, 398:11, 398:15, 399:10, 399:17, 399:24, 400:1, 400:9, 400:19, 400:24, 401:3, 401:5, 401:15, 407:8, 407:18, 409:7, 427:5, 428:5, 428:10, 428:17, 428:20, 430:3, 430:8, 430:10, 430:15, 430:18, 439:1, 439:4, 439:7, 439:14, 439:18, 446:15, 447:2, 483:13, 496:9, 529:3, 529:22, 530:14, 530:19, 532:16, 534:12, 536:18, 536:25, 537:19, 548:20, 549:1, 549:7, 562:14, 562:25, 564:7, 564:21, 565:8, 565:20, 566:13, 567:6, 567:13, 581:9, 581:16, 582:10,</p>	<p>584:21 field ^[4] - 351:16, 447:23, 479:1, 484:18 Field ^[1] - 335:10 fields ^[2] - 500:21, 524:21 Fifth ^[2] - 336:12, 338:19 Figure ^[14] - 333:13, 336:13, 336:16, 336:17, 336:17, 336:18, 336:18, 336:19, 336:19, 336:20, 336:20, 336:21, 336:21, 336:22 figure ^[5] - 381:14, 388:6, 388:7, 523:7, 527:8 figures ^[3] - 390:8, 529:16, 529:18 Figures ^[1] - 333:3 file ^[8] - 344:12, 355:19, 356:9, 356:17, 416:9, 433:5, 451:25, 529:23 filed ^[12] - 410:22, 559:8, 573:11, 575:15, 575:17, 575:18, 575:20, 575:21, 577:15, 581:8, 581:24, 583:9 filing ^[1] - 558:4 filled ^[1] - 479:18 final ^[22] - 364:5, 364:11, 364:14, 366:22, 375:19, 375:23, 377:8, 378:7, 394:12, 394:17, 401:22, 405:9, 405:10, 431:23, 449:18, 529:24, 540:9, 543:20, 552:1, 574:9, 576:14, 576:22 Final ^[4] - 339:9, 339:10, 339:12, 339:12 finally ^[7] - 417:17, 435:14, 456:22, 457:14, 562:15, 577:25, 580:2 financial ^[3] - 554:2, 554:4, 566:2 Findings ^[1] - 336:11 findings ^[3] - 417:8, 441:21, 583:16</p>
<p style="text-align: center;">F</p>				
<p>FAA ^[6] - 339:15, 575:16, 577:16, 578:6, 578:12, 578:18 facade ^[2] - 359:16, 359:17 faces ^[1] - 479:7 Facilities ^[1] - 336:16 facilities ^[7] - 416:2, 416:3, 501:6, 542:5, 542:6, 542:8, 552:24</p>				

finish [2] - 468:1, 515:18 firm [3] - 343:11, 465:11, 465:14 firmly [1] - 474:11 first [30] - 346:22, 353:23, 357:1, 359:13, 390:7, 397:21, 399:3, 408:3, 411:22, 428:15, 445:25, 450:12, 453:10, 458:18, 458:19, 467:20, 473:2, 476:9, 478:6, 513:16, 538:23, 547:2, 549:3, 549:6, 550:3, 557:2, 557:5, 558:9, 578:8, 580:14 First [4] - 333:14, 334:11, 336:10, 340:3 firsthand [2] - 507:15, 535:17 Fish [16] - 333:21, 333:22, 334:3, 334:5, 495:1, 495:15, 497:8, 497:10, 499:13, 499:17, 505:15, 506:10, 511:2, 562:20, 563:8, 563:17 fit [1] - 554:17 Fitbit [2] - 467:4, 467:5 fitted [1] - 487:19 five [16] - 352:7, 352:9, 373:4, 382:21, 402:7, 454:11, 457:25, 480:11, 482:11, 487:13, 571:24, 575:16, 578:6, 578:12, 578:18, 579:3 five-minute [1] - 571:24 fixed [1] - 530:23 flag [1] - 526:4 flagship [1] - 432:14 flicker [62] - 343:7, 344:1, 345:12, 346:16, 349:24, 351:17, 355:16, 358:25, 359:1, 359:18, 360:7, 361:2, 361:4, 361:9, 361:11, 362:2, 362:15, 365:12,	371:17, 372:25, 378:7, 378:9, 378:11, 379:14, 379:15, 379:18, 385:17, 386:6, 386:12, 394:17, 399:8, 399:11, 399:19, 400:13, 415:24, 433:22, 442:14, 442:16, 444:1, 445:12, 452:25, 454:19, 454:20, 454:24, 454:25, 455:2, 455:5, 455:6, 455:10, 455:11, 455:17, 458:6, 471:13, 483:23, 484:4, 484:8, 484:11, 484:16, 484:21, 493:2, 575:1, 575:21 Flicker [9] - 333:8, 335:4, 335:19, 335:24, 336:4, 338:12, 341:8, 341:10, 341:12 flickering [3] - 379:1, 484:12, 484:14 focus [7] - 375:19, 378:8, 378:15, 497:21, 512:14, 537:9, 537:12 focused [3] - 376:23, 378:17, 478:5 focuses [1] - 456:4 focusing [2] - 447:24, 504:15 folks [4] - 380:12, 441:1, 491:3, 584:5 follow [10] - 374:13, 374:23, 383:2, 414:13, 414:14, 446:15, 478:15, 493:18, 532:24, 571:19 follow-up [6] - 414:13, 414:14, 446:15, 478:15, 493:18, 532:24 following [8] - 329:1, 345:15, 362:15, 363:16, 415:17, 493:5, 545:22, 545:25 follows [1] - 356:1 footnote [2] - 470:7, 471:4 footprint [4] - 401:17, 502:15, 544:23,	545:6 FOR [1] - 328:4 forced [1] - 448:5 foreshadow [1] - 363:5 forgive [2] - 424:3, 487:10 form [1] - 465:19 formal [4] - 561:8, 561:12, 561:17, 568:12 format [1] - 409:14 forms [1] - 502:3 forth [8] - 372:20, 389:21, 437:2, 438:6, 444:8, 445:1, 568:6, 571:8 Forward [1] - 336:16 forward [4] - 475:20, 521:17, 524:9, 525:13 foundational [2] - 579:16, 581:4 foundations [1] - 423:23 four [3] - 439:11, 487:8, 548:21 Fourth [1] - 336:8 fourth [4] - 400:19, 472:16, 473:19, 482:4 fragmentation [5] - 501:21, 502:2, 502:12, 520:25 fragmenting [1] - 502:7 frame [4] - 385:8, 517:21, 518:5, 531:14 framework [3] - 374:3, 375:3, 560:13 frankly [1] - 435:8 Fransen [3] - 401:2, 401:3, 401:4 Frequency [6] - 335:13, 337:10, 339:3, 339:5, 340:11, 340:14 frequency [11] - 335:15, 417:19, 425:3, 434:24, 434:25, 435:6, 435:12, 454:6, 454:9, 454:12, 471:13 frequent [1] - 452:24 friend [1] - 583:3 Fright [1] - 337:23 front [14] - 366:16, 367:5, 373:10,	373:18, 442:16, 459:2, 461:13, 465:9, 516:1, 541:18, 542:24, 551:13, 553:4 frustrated [1] - 492:10 full [10] - 390:13, 411:11, 412:1, 412:6, 475:16, 476:9, 478:6, 509:22, 509:25, 564:1 fully [1] - 391:1 functioning [1] - 486:12 fund [2] - 554:12, 555:18 fundamental [1] - 347:12 furthermore [1] - 435:11 future [4] - 353:16, 508:8, 510:6, 522:8	371:2, 371:4, 372:16, 374:25, 377:17, 377:25, 382:25, 403:23, 404:13, 404:15, 407:3, 414:12, 418:6, 431:5, 435:23, 447:8, 458:13, 458:15, 482:20, 483:7, 493:20, 494:13, 494:20, 496:7, 513:12, 513:14, 517:22, 518:7, 540:6, 544:4, 544:6, 546:11, 548:12, 551:24, 555:12, 557:21, 560:12, 560:21, 561:3, 574:7, 576:11, 576:17, 576:24, 577:4, 577:7, 578:3, 578:5, 578:11, 578:16, 578:22, 578:25, 579:2, 579:6, 579:9, 579:12, 580:12, 582:3, 582:14 Ganje [27] - 328:20, 330:5, 330:9, 330:11, 330:14, 330:19, 330:21, 331:4, 331:8, 331:12, 331:14, 331:23, 332:5, 332:8, 332:12, 366:9, 372:14, 393:14, 408:6, 414:11, 431:3, 513:15, 513:22, 516:25, 517:20, 544:9, 557:22 gap [2] - 479:17, 517:12 garner [1] - 474:3 GARY [1] - 328:11 Gate [1] - 340:14 gather [3] - 508:5, 510:11, 525:15 gathering [1] - 510:9 gauge [1] - 572:25 gavel [1] - 583:18 GE [2] - 336:23, 337:3 geese [2] - 536:7, 536:9 general [10] - 387:12, 448:7, 457:18, 501:16, 502:10, 510:21, 524:7, 531:19, 534:23,
G				
gained [1] - 445:23 Game [12] - 495:1, 495:15, 497:8, 497:10, 499:13, 499:17, 505:15, 506:10, 511:2, 562:20, 563:8, 563:17 game [6] - 497:20, 503:21, 504:13, 504:16, 504:17, 509:13 GANJE [103] - 344:14, 344:22, 345:2, 345:4, 345:9, 345:11, 346:1, 346:4, 346:9, 346:18, 347:6, 347:12, 347:21, 348:2, 348:6, 348:12, 348:21, 349:7, 349:10, 349:17, 352:4, 355:3, 363:8, 363:14, 364:8, 364:24, 365:4, 366:10, 366:13, 366:20, 366:23, 367:1, 367:6, 367:12, 367:15, 367:19, 367:22, 368:5, 368:9, 368:16, 368:19, 369:1, 369:6, 369:11, 369:16,				

<p>563:10 generally [3] - 388:9, 462:17, 553:18 generate [1] - 434:23 generating [1] - 416:2 Generator [1] - 336:24 Generic [1] - 337:3 generically [1] - 409:19 genesis [1] - 408:22 gentleman [1] - 386:13 geographic [4] - 514:22, 517:1, 524:15, 524:16 geographical [2] - 522:5, 522:24 Geology [3] - 336:19, 336:20, 336:20 George [1] - 340:16 German [2] - 455:15 germane [1] - 374:17 Germany [1] - 435:4 GF&P [2] - 563:21, 564:2 GFP [2] - 519:12, 525:6 given [14] - 426:16, 464:19, 469:20, 472:10, 474:15, 481:6, 509:21, 509:22, 529:12, 553:16, 556:3, 557:7, 563:18, 573:21 glaciated [1] - 503:4 glacier [2] - 502:18, 502:20 glance [1] - 352:13 glass [3] - 359:15, 359:18, 399:21 global [2] - 573:19, 573:24 goal [1] - 565:13 Goals [1] - 340:16 good-faith [1] - 562:6 gosh [2] - 441:1, 492:8 graduate [1] - 485:22 graduation [1] - 415:17 grand [2] - 510:8, 521:9 Granquist [1] - 339:16 GRANT [1] - 328:5 Grant [22] - 357:24, 358:11, 358:15, 358:20, 358:22, 362:21, 373:18, 375:9, 401:6,</p>	<p>401:14, 404:25, 454:1, 461:12, 503:10, 515:18, 547:25, 553:19, 554:4, 566:8, 571:2, 571:8, 571:16 grant [5] - 369:20, 373:11, 375:2, 405:1, 496:14 grasses [2] - 529:11, 581:19 grassland [21] - 502:6, 502:7, 502:9, 503:7, 503:17, 503:19, 504:8, 514:3, 514:10, 519:5, 519:10, 521:5, 522:4, 524:9, 524:12, 524:20, 524:24, 530:7, 534:25, 582:7, 582:8 grassland-dependent [2] - 519:5, 534:25 grassland-related [1] - 503:7 Grasslands [1] - 339:19 grasslands [2] - 500:22, 503:6 great [6] - 457:23, 469:21, 475:13, 478:16, 524:22, 527:3 greater [9] - 388:18, 419:4, 441:2, 445:9, 464:21, 466:14, 483:1, 503:18, 527:16 greatest [3] - 502:1, 519:9, 524:6 greatly [2] - 414:2, 580:18 Green [1] - 337:24 greenhouse [2] - 359:14, 399:20 Greg [2] - 328:15, 567:13 ground [12] - 357:8, 411:13, 412:3, 427:20, 493:7, 504:9, 505:8, 505:9, 522:11, 524:20, 535:16, 536:12 grounds [4] - 369:17, 370:8, 580:13, 580:25 group [12] - 343:16, 366:1, 384:25, 385:7, 402:16,</p>	<p>402:25, 415:6, 489:24, 515:19, 516:21, 534:5 grouse [45] - 503:9, 503:10, 503:13, 503:16, 503:22, 503:24, 504:3, 504:6, 504:10, 504:13, 504:19, 504:20, 504:25, 505:2, 505:14, 506:15, 507:2, 507:8, 508:7, 508:12, 508:18, 509:15, 509:16, 512:8, 512:13, 512:25, 513:3, 521:18, 522:4, 522:8, 527:14, 527:15, 527:16, 530:9, 530:15, 530:17, 533:5, 535:4, 535:8, 535:22, 535:24, 536:4, 536:6 guard [1] - 530:5 guess [19] - 388:11, 392:11, 402:17, 408:18, 413:12, 413:14, 422:25, 457:21, 531:1, 531:12, 534:17, 539:1, 539:5, 554:1, 564:11, 565:18, 566:13, 568:10, 581:3 guidance [3] - 333:23, 468:6, 554:22 guideline [5] - 461:17, 467:16, 467:19, 467:20, 475:9 guidelines [1] - 481:16 Guidelines [4] - 334:5, 335:12, 337:17, 340:20 guy [1] - 424:22 guys [1] - 401:18</p>	<p>519:10, 519:17, 524:10, 524:20, 524:24, 532:20 Haley [41] - 333:11, 334:23, 338:12, 340:24, 341:3, 341:3, 341:4, 341:4, 341:5, 341:5, 341:6, 341:6, 341:7, 341:8, 341:9, 341:10, 341:11, 342:20, 343:1, 344:23, 355:12, 362:8, 365:8, 366:14, 366:15, 367:22, 375:17, 384:21, 390:2, 392:19, 394:6, 396:12, 402:3, 402:24, 404:16, 419:14, 426:12, 433:23, 469:3, 575:23, 581:7 HALEY [1] - 331:10 Haley's [4] - 422:9, 422:13, 422:20, 581:12 half [11] - 426:14, 458:4, 464:14, 467:1, 474:6, 490:11, 505:10, 527:8, 527:23, 528:5, 549:2 half-mile [3] - 527:8, 527:23, 528:5 hand [12] - 352:5, 367:9, 367:25, 368:7, 475:14, 478:6, 480:14, 480:19, 481:1, 496:22, 542:22, 546:16 handed [1] - 365:8 hang [1] - 491:3 Hankard [6] - 409:1, 409:11, 409:13, 411:2, 411:7, 411:8 Hanson [30] - 328:22, 330:4, 330:6, 330:15, 330:16, 331:12, 331:16, 331:17, 331:24, 332:4, 332:6, 384:20, 402:3, 422:1, 446:16, 485:11, 492:11, 493:1, 496:18, 496:24, 497:3, 518:10, 520:20, 523:25, 525:10, 538:13, 539:1,</p>	<p>583:19, 584:22 HANSON [129] - 328:11, 352:15, 353:7, 353:21, 354:1, 354:10, 355:8, 370:23, 373:25, 375:16, 377:24, 381:2, 381:5, 381:23, 383:3, 384:16, 384:21, 384:23, 385:13, 385:17, 386:1, 386:17, 387:13, 388:1, 388:16, 389:4, 389:9, 389:25, 404:1, 407:6, 408:5, 408:12, 408:17, 409:5, 414:14, 418:9, 418:11, 421:23, 422:2, 422:5, 422:11, 422:14, 422:17, 422:23, 423:14, 423:18, 423:24, 424:3, 424:6, 424:22, 425:15, 426:1, 426:6, 426:8, 431:9, 431:21, 439:20, 439:22, 439:24, 440:2, 440:11, 440:19, 442:2, 442:21, 443:4, 443:13, 443:19, 445:10, 446:11, 467:24, 483:10, 483:19, 483:21, 485:6, 485:12, 485:15, 485:24, 486:4, 487:10, 490:24, 491:4, 491:18, 492:8, 492:23, 493:22, 494:23, 495:9, 495:18, 496:10, 496:21, 497:2, 499:7, 499:12, 511:19, 518:11, 518:14, 519:11, 520:14, 522:10, 523:15, 525:4, 526:8, 538:9, 539:22, 540:10, 549:8, 549:11, 549:18, 549:21, 549:24, 550:11, 567:9, 567:14, 567:20, 567:25, 568:4, 568:13, 569:3, 569:6, 569:9, 569:17, 570:11,</p>
H				
<p>habitat [16] - 497:20, 500:5, 500:8, 500:13, 500:15, 500:16, 500:19, 500:24, 501:2, 502:2, 502:17, 503:17, 503:19, 520:4, 521:5, 522:4 Habitat [1] - 333:7 habitats [8] - 504:8,</p>				

574:18, 581:12, 583:24, 584:15, 584:17, 584:20, 584:22 Hanson's [3] - 402:8, 570:21, 571:19 happy [2] - 456:19, 470:6 hard [2] - 394:11, 395:9 harmful [2] - 435:1, 435:5 Harvard [2] - 432:14, 433:3 Harvest [1] - 409:14 hate [1] - 485:16 hazard [9] - 445:2, 445:8, 448:23, 448:24, 448:25, 449:4, 449:5, 449:8, 449:10 head [7] - 347:2, 446:19, 511:16, 513:22, 528:21, 530:6, 530:13 headphones [1] - 446:18 Health [33] - 335:7, 335:12, 335:14, 335:16, 335:17, 337:6, 337:23, 338:7, 340:14, 437:7, 437:23, 438:12, 441:14, 441:15, 441:25, 446:7, 446:8, 453:3, 456:2, 456:15, 457:3, 461:17, 466:23, 467:7, 467:15, 467:18, 469:5, 474:6, 474:9, 475:22, 477:14, 479:10, 487:7 health [69] - 417:9, 425:18, 425:20, 426:3, 432:18, 432:23, 433:4, 433:15, 433:19, 433:24, 434:13, 434:21, 435:15, 436:7, 437:24, 438:18, 439:5, 439:9, 439:16, 442:3, 442:6, 442:25, 443:3, 443:6, 444:10, 445:12, 446:10, 448:25, 449:3, 449:9, 449:12, 450:8, 450:9, 450:10, 450:24, 451:2, 451:8, 453:9, 453:15, 454:5, 454:18, 454:20, 457:17, 462:4, 465:14, 465:25, 466:4, 466:10, 470:13, 470:25, 471:3, 471:8, 472:2, 475:5, 475:9, 475:24, 476:3, 478:13, 478:23, 479:9, 480:6, 482:2, 485:20, 485:23, 486:5, 486:6, 486:13 health-based [3] - 472:2, 475:24, 476:3 Health-based [1] - 335:12 health-related [1] - 432:18 hear [11] - 442:13, 442:15, 457:11, 466:22, 467:10, 496:15, 534:13, 536:1, 536:3, 536:10, 583:10 heard [6] - 426:11, 437:8, 441:14, 456:24, 457:21, 563:2 hearing [22] - 342:2, 342:8, 346:5, 347:23, 348:2, 348:22, 394:23, 395:3, 395:7, 430:3, 456:24, 464:10, 466:5, 494:5, 498:20, 535:21, 557:11, 558:6, 566:21, 575:10, 583:20, 584:24 Hearing [7] - 340:18, 352:18, 381:5, 482:13, 499:8, 583:21, 583:24 hearings [3] - 346:24, 451:22, 456:25 heart [2] - 436:8, 436:15 heck [1] - 443:24 height [3] - 357:6, 359:10, 411:13 held [4] - 329:2, 450:23, 461:5, 469:24 hello [1] - 432:10 help [15] - 364:16, 396:24, 426:10, 449:22, 455:17, 475:12, 475:19, 479:5, 479:6, 526:7, 526:12, 534:1, 556:22, 563:1, 570:24 helpful [4] - 430:19, 487:6, 508:5, 561:20 helping [1] - 420:10 hence [1] - 522:2 HEREBY [1] - 585:8 Hessler [51] - 338:24, 339:5, 339:11, 339:12, 339:12, 339:13, 340:3, 340:16, 364:1, 364:5, 364:23, 365:19, 365:24, 366:2, 366:13, 376:1, 376:8, 376:21, 378:14, 386:19, 389:10, 390:25, 402:5, 402:16, 403:1, 403:6, 405:20, 407:13, 408:4, 408:9, 408:14, 408:22, 410:1, 410:3, 410:13, 410:14, 410:18, 414:7, 414:16, 414:17, 415:11, 456:24, 457:6, 457:21, 457:22, 491:2, 582:9 HESSLER [1] - 330:3 Hessler's [6] - 339:3, 376:14, 381:19, 390:4, 405:13, 406:4 high [16] - 389:21, 394:3, 436:10, 442:21, 442:22, 442:24, 443:4, 443:8, 443:20, 444:25, 445:3, 501:7, 501:14, 515:4, 536:7, 537:21 higher [6] - 388:11, 419:11, 435:9, 445:8, 525:2, 527:22 highlighted [1] - 520:16 highly [3] - 371:25, 488:8 highways [1] - 406:23 hilarious [1] - 550:2 Hills [1] - 495:10 himself [1] - 375:6 hindering [1] - 486:12 historic [2] - 504:24, 533:1 historical [1] - 398:23 Historical [1] - 541:7 history [5] - 375:5, 402:22, 436:11, 455:15, 539:18 hits [1] - 582:20 hold [4] - 450:22, 467:24, 485:19, 496:12 holding [1] - 451:23 home [5] - 427:22, 455:7, 455:10, 458:2, 468:13 homes [9] - 405:14, 405:25, 453:14, 453:17, 453:24, 454:2, 455:4, 458:3, 458:7 honest [1] - 530:5 honestly [3] - 375:10, 522:18, 528:7 Honor [1] - 381:3 honorable [2] - 370:9, 561:3 hook [1] - 410:9 hope [4] - 389:9, 396:17, 410:19, 549:11 hopeful [1] - 520:8 hopefully [1] - 458:20 horizon [1] - 360:16 horseness [1] - 517:22 hospital [3] - 432:13, 432:14, 444:14 host [1] - 488:21 hosting [1] - 489:6 hour [6] - 378:23, 395:9, 468:17, 510:1, 529:9, 532:1 hours [24] - 360:7, 360:21, 360:22, 361:3, 361:7, 361:8, 361:9, 361:10, 361:15, 361:17, 380:21, 380:22, 396:25, 398:19, 398:20, 398:24, 400:14, 400:22, 401:11, 445:13, 455:9, 455:11, 455:17, 458:6 house [8] - 359:15, 399:21, 455:8, 461:4, 484:12, 484:14, 485:2 housekeeping [1] - 342:5 houses [1] - 376:15 hub [1] - 411:13 Hueck [1] - 328:15 Human [1] - 335:16 human [12] - 425:18, 426:3, 448:25, 449:9, 462:4, 462:18, 465:25, 466:4, 466:10, 470:25, 471:2, 471:8 humorous [1] - 567:12 hundred [1] - 351:13 Hypothesis [2] - 337:13, 338:4 hypothetical [1] - 531:22 Hz [1] - 336:24 	
	I
	I1 [1] - 340:10 I10 [2] - 340:21, 465:5 I11 [1] - 340:22 I12 [1] - 340:22 I13 [1] - 340:23 I14 [1] - 340:23 I15-A [1] - 340:24 I15-B [1] - 340:24 I16 [1] - 341:3 I17-A [1] - 341:3 I17-B [1] - 341:4 I18 [1] - 341:4 I19 [1] - 341:5 I2 [1] - 340:12 I20 [1] - 341:5 I21 [1] - 341:6 I22 [1] - 341:6 I23 [1] - 341:7 I24 [1] - 341:8 I25 [1] - 341:9 I26 [1] - 341:10 I27 [1] - 341:11 I3 [1] - 340:13 I4 [1] - 340:14 I5 [1] - 340:16 I6 [1] - 340:18 I7 [1] - 340:19 I8 [1] - 340:20 I9-A [1] - 340:20 I9-B [2] - 340:21, 458:22 IAIA [1] - 340:23 ICD [2] - 434:15, 434:19 ID [2] - 335:3, 338:17 idea [7] - 387:2, 392:16, 404:8, 413:15, 423:18, 463:22, 573:1 Ideal [1] - 343:11 ideal [1] - 518:6

<p>ideally [3] - 443:18, 479:2, 565:24</p> <p>identical [1] - 569:7</p> <p>identification [1] - 363:16</p> <p>Identification [2] - 335:20, 335:22</p> <p>identified [10] - 345:13, 363:3, 364:2, 365:15, 382:3, 463:7, 465:11, 539:19, 543:11, 558:3</p> <p>Identified [1] - 339:13</p> <p>identify [7] - 365:9, 365:21, 375:18, 384:14, 462:23, 561:10, 578:5</p> <p>identifying [1] - 578:12</p> <p>ignore [4] - 442:2, 442:3, 442:25, 487:3</p> <p>II [9] - 328:4, 328:19, 361:22, 361:23, 379:25, 380:3, 380:9, 461:10</p> <p>III [3] - 328:9, 542:17, 549:13</p> <p>imagine [2] - 469:8, 489:5</p> <p>immediately [1] - 463:2</p> <p>Impact [4] - 335:9, 337:14, 337:20, 338:7</p> <p>impact [18] - 364:6, 365:14, 376:15, 376:23, 377:8, 391:19, 392:3, 417:9, 454:20, 500:16, 507:23, 513:3, 513:6, 522:7, 522:20, 523:12, 523:24, 531:15</p> <p>impacted [4] - 453:21, 507:21, 514:16, 530:3</p> <p>Impacts [1] - 337:15</p> <p>impacts [40] - 361:19, 361:21, 362:7, 362:15, 364:18, 364:22, 365:13, 365:16, 365:22, 376:9, 376:24, 378:11, 378:12, 378:14, 378:19, 453:15, 500:7, 500:8, 500:24, 507:7, 508:6, 509:6, 510:9, 510:20,</p>	<p>510:23, 514:9, 514:11, 519:2, 519:17, 520:3, 522:9, 523:17, 523:19, 524:4, 526:7, 531:4, 532:3, 532:19, 553:12, 570:4</p> <p>impairment [1] - 455:25</p> <p>implement [1] - 517:4</p> <p>implications [1] - 444:11</p> <p>importance [4] - 502:23, 531:24, 532:12, 533:13</p> <p>important [22] - 372:24, 376:6, 434:3, 434:10, 434:12, 436:16, 436:21, 436:24, 486:8, 486:20, 488:22, 491:20, 501:22, 510:5, 510:14, 515:3, 525:25, 537:3, 537:4, 559:18, 564:25</p> <p>importantly [1] - 514:22</p> <p>impossibility [1] - 357:19</p> <p>impossible [2] - 501:14, 524:14</p> <p>impressed [2] - 446:6, 558:14</p> <p>impression [1] - 573:18</p> <p>improve [2] - 410:5, 411:6</p> <p>Improved [1] - 335:19</p> <p>IN [2] - 328:4, 328:5</p> <p>in-depth [1] - 549:4</p> <p>inadmissible [2] - 351:7, 352:3</p> <p>inadvertently [1] - 576:21</p> <p>inappropriate [4] - 346:17, 349:6, 351:21, 417:22</p> <p>Incl [1] - 337:10</p> <p>include [15] - 363:2, 370:18, 376:10, 376:24, 378:2, 380:13, 391:14, 397:8, 429:25, 436:25, 463:12, 466:5, 542:7, 547:19, 569:12</p> <p>included [25] - 358:4,</p>	<p>360:10, 361:21, 362:5, 363:4, 365:1, 370:14, 380:5, 380:9, 380:10, 402:8, 402:12, 402:15, 402:25, 403:6, 403:7, 403:18, 403:20, 408:23, 413:19, 459:17, 466:24, 556:13, 558:16, 576:19</p> <p>includes [7] - 404:25, 416:18, 459:22, 497:20, 504:18, 573:3, 577:21</p> <p>Including [1] - 335:15</p> <p>including [16] - 344:1, 350:15, 357:5, 357:8, 357:13, 423:10, 427:25, 435:16, 453:9, 456:2, 464:3, 464:22, 472:11, 478:19, 483:2, 578:1</p> <p>inclusion [1] - 417:7</p> <p>inconsistency [1] - 419:4</p> <p>inconsistent [1] - 417:18</p> <p>inconvenience [1] - 540:15</p> <p>incorporate [2] - 359:6, 419:21</p> <p>incorrect [1] - 462:15</p> <p>increase [12] - 391:5, 391:8, 400:13, 403:9, 416:24, 421:8, 421:14, 421:19, 426:22, 427:1, 443:12, 445:7</p> <p>increased [2] - 421:5, 456:23</p> <p>increases [1] - 426:14</p> <p>Indeed [1] - 405:2</p> <p>indeed [6] - 459:3, 459:9, 460:11, 462:19, 473:10, 544:16</p> <p>Independent [1] - 338:8</p> <p>Indiana [1] - 451:22</p> <p>indicate [10] - 348:24, 358:18, 362:3, 368:6, 368:10, 440:5, 512:24, 531:15, 551:17, 578:7</p> <p>indicated [18] - 345:21, 347:9,</p>	<p>348:25, 363:24, 372:17, 377:18, 390:5, 408:7, 408:8, 437:20, 453:1, 455:20, 455:21, 456:12, 473:13, 479:16, 492:12, 512:7</p> <p>indicates [4] - 392:23, 452:18, 480:21, 516:4</p> <p>indicating [2] - 347:13, 408:6</p> <p>indicating [1] - 348:13</p> <p>indicative [1] - 444:22</p> <p>indirect [1] - 438:16</p> <p>individual [11] - 354:12, 434:3, 443:23, 478:25, 479:8, 488:23, 489:10, 489:19, 511:13, 521:19, 523:12</p> <p>individually [1] - 533:24</p> <p>individuals [5] - 472:12, 477:5, 491:15, 492:7, 492:17</p> <p>industrial [2] - 406:23, 416:3</p> <p>industry [5] - 354:4, 394:10, 419:2, 484:13, 493:4</p> <p>infarction [1] - 466:6</p> <p>inform [1] - 479:6</p> <p>informal [2] - 561:16, 568:10</p> <p>information [68] - 353:23, 354:13, 355:24, 356:1, 359:11, 364:8, 364:9, 368:13, 368:22, 373:2, 374:17, 374:24, 379:22, 381:15, 385:6, 402:22, 440:21, 441:16, 441:18, 442:5, 445:19, 446:6, 478:19, 498:10, 502:11, 505:22, 506:3, 507:15, 507:19, 508:4, 510:5, 510:7, 510:10, 510:11, 510:13, 510:19, 510:25, 511:11, 517:9, 519:3, 520:9,</p>	<p>521:11, 522:8, 522:19, 523:8, 524:1, 525:1, 525:16, 525:20, 527:20, 528:9, 529:18, 529:23, 531:12, 532:9, 532:15, 537:14, 546:6, 547:23, 550:23, 551:8, 551:17, 559:4, 559:8, 568:6, 577:21, 578:2, 584:6</p> <p>informed [1] - 448:8</p> <p>Informed [1] - 337:21</p> <p>infrasound [16] - 417:8, 423:10, 424:23, 425:3, 434:23, 434:24, 435:6, 435:12, 452:24, 454:6, 454:10, 454:13, 454:16, 478:13, 478:20, 478:23</p> <p>Infrasound [8] - 335:12, 335:14, 335:16, 337:10, 339:4, 339:6, 340:11, 340:14</p> <p>infrastructure [4] - 501:6, 501:15, 506:11, 519:10</p> <p>initial [7] - 355:23, 372:23, 499:20, 557:17, 559:9, 559:14, 569:12</p> <p>initials [5] - 345:18, 347:19, 353:20, 367:10, 373:6</p> <p>input [6] - 343:18, 359:2, 359:8, 511:1, 511:2, 560:1</p> <p>inputs [9] - 357:4, 359:2, 397:22, 419:4, 419:10, 419:25, 420:5, 427:17, 431:18</p> <p>inquire [1] - 404:6</p> <p>inquired [1] - 346:3</p> <p>inside [2] - 442:17, 484:12</p> <p>insight [1] - 510:20</p> <p>installation [1] - 386:23</p> <p>Installations [1] - 337:7</p> <p>installed [1] - 577:22</p> <p>instance [2] - 429:23, 520:16</p> <p>instances [5] -</p>
--	--	--	--	---

012801

<p>537:13, 537:15, 539:1, 539:9, 562:21, 563:22, 580:22</p> <p>knows [2] - 445:5, 563:23</p> <p>Krishna [1] - 340:13</p> <p>Kristen [1] - 328:22</p> <p>Kristi [1] - 334:11</p> <p>KRISTIE [1] - 328:12</p> <p>Kristie [2] - 427:6, 529:4</p>	<p>554:24, 556:3, 557:8, 563:20, 565:5, 567:19, 571:4, 571:10</p> <p>lapse [1] - 344:6</p> <p>lapsed [4] - 345:17, 345:20, 348:17, 353:9</p> <p>laptop [1] - 366:17</p> <p>large [3] - 515:23, 516:6, 546:21</p> <p>larger [2] - 502:5, 503:18</p> <p>largest [1] - 437:23</p> <p>last [28] - 342:15, 378:16, 390:5, 393:13, 393:20, 394:16, 428:22, 428:25, 430:4, 437:6, 444:9, 445:23, 451:1, 452:18, 475:16, 476:19, 480:14, 486:21, 494:7, 516:4, 517:25, 525:5, 529:14, 559:16, 561:6, 561:15, 571:6, 580:20</p> <p>late [3] - 450:12, 461:9, 581:24</p> <p>late-filed [1] - 581:24</p> <p>latest [6] - 356:15, 358:19, 362:15, 380:24, 434:14, 581:22</p> <p>law [4] - 541:14, 554:21, 554:24, 555:11</p> <p>laws [3] - 350:8, 570:6, 570:7</p> <p>lawsuit [1] - 370:24</p> <p>lawyer [1] - 368:14</p> <p>lawyer's [1] - 554:22</p> <p>lawyers [3] - 397:23, 397:24</p> <p>lay [1] - 542:9</p> <p>layer [1] - 390:11</p> <p>layout [5] - 362:9, 362:16, 500:10, 512:17, 520:12</p> <p>layperson [2] - 563:4, 563:12</p> <p>lead [5] - 437:7, 449:6, 455:25, 558:10, 571:19</p> <p>leader [2] - 351:16, 469:16</p> <p>leading [2] - 343:22, 443:8</p>	<p>learn [4] - 346:1, 447:25, 448:6, 584:3</p> <p>learned [3] - 345:17, 351:21, 393:24</p> <p>learning [2] - 371:18, 410:19</p> <p>least [16] - 360:16, 367:23, 386:21, 418:21, 438:19, 439:11, 440:19, 441:25, 459:23, 461:6, 467:12, 487:2, 499:18, 499:19, 523:18, 562:22</p> <p>leave [1] - 342:6</p> <p>led [1] - 490:24</p> <p>left [5] - 475:14, 480:14, 480:19, 502:20, 556:6</p> <p>left-hand [3] - 475:14, 480:14, 480:19</p> <p>legal [2] - 560:10, 565:9</p> <p>legislation [1] - 554:19</p> <p>legislature [1] - 554:20</p> <p>legitimacy [1] - 370:5</p> <p>Lek [1] - 340:7</p> <p>lek [43] - 504:9, 505:22, 506:17, 506:20, 508:12, 508:25, 509:21, 509:25, 511:3, 521:19, 525:12, 527:6, 531:23, 532:13, 533:1, 533:9, 533:10, 534:15, 534:16, 534:18, 534:19, 534:21, 535:4, 535:9, 535:22, 535:24, 536:1, 536:2, 536:4, 536:6, 536:10, 536:17, 536:22, 537:18, 556:18, 562:18, 562:19, 562:21, 563:5, 563:13, 563:16, 567:18</p> <p>lekking [1] - 508:17</p> <p>leks [54] - 504:23, 505:1, 505:3, 505:6, 505:17, 505:19, 505:20, 505:23, 505:25, 506:3, 506:5, 506:11, 507:2, 509:3, 509:8, 509:16, 509:17,</p>	<p>509:18, 509:20, 511:9, 512:8, 512:13, 512:15, 512:19, 512:20, 512:25, 513:7, 531:2, 531:5, 532:25, 533:8, 533:15, 533:16, 533:19, 533:23, 533:24, 534:5, 535:7, 535:11, 535:14, 535:20, 536:15, 537:3, 537:9, 537:15, 537:23, 538:2, 539:2, 539:9, 563:23, 563:25, 564:4</p> <p>length [2] - 509:6, 514:20</p> <p>lengthy [1] - 553:11</p> <p>Leq [2] - 469:7, 469:12</p> <p>less [25] - 360:7, 405:25, 425:17, 426:2, 428:17, 441:1, 441:13, 457:11, 461:16, 462:8, 463:13, 472:11, 474:15, 481:7, 481:14, 482:7, 488:2, 488:12, 490:15, 503:14, 509:17, 518:5, 528:5, 528:23, 558:10</p> <p>lessen [1] - 532:3</p> <p>lesser [1] - 527:24</p> <p>letter [3] - 379:7, 379:10, 577:20</p> <p>Letter [19] - 333:17, 333:18, 333:19, 333:20, 333:21, 336:9, 336:10, 336:16, 338:18, 339:17, 340:22, 341:5, 341:6, 341:6, 341:7, 341:8, 341:9, 341:10, 341:11</p> <p>letters [2] - 347:8, 373:1</p> <p>level [48] - 389:12, 389:19, 391:1, 411:13, 412:3, 412:7, 412:10, 412:12, 412:13, 412:17, 413:21, 415:24, 416:1, 416:6, 416:8, 416:19, 416:23, 417:4, 417:21,</p>	<p>421:6, 425:2, 22 425:17, 426:13, 429:12, 430:11, 431:13, 435:13, 452:23, 453:12, 453:23, 454:15, 454:16, 455:25, 456:14, 468:11, 468:12, 470:4, 477:25, 485:22, 488:23, 489:3, 525:2, 527:22, 537:22, 577:18</p> <p>Level [12] - 333:8, 335:3, 335:13, 338:14, 338:15, 338:15, 338:16, 338:16, 339:15, 340:16, 542:17, 549:13</p> <p>levels [51] - 357:14, 376:18, 376:25, 386:24, 387:6, 403:9, 405:14, 405:25, 415:12, 416:22, 416:25, 417:13, 417:16, 419:12, 420:3, 421:8, 422:22, 425:12, 427:22, 429:11, 434:24, 435:1, 435:7, 435:9, 435:16, 437:25, 438:7, 438:14, 441:19, 444:24, 444:25, 445:9, 454:5, 457:19, 457:23, 458:4, 460:8, 464:20, 464:24, 465:24, 466:9, 466:14, 477:1, 482:25, 483:4, 486:23, 487:1, 488:1, 489:8, 513:2, 513:3</p> <p>Levels [1] - 338:6</p> <p>liability [2] - 368:21, 369:3</p> <p>liable [1] - 371:20</p> <p>liberty [1] - 528:17</p> <p>License [5] - 341:3, 341:3, 341:4, 341:4, 341:5</p> <p>license [12] - 345:17, 345:20, 347:19, 348:1, 350:3, 350:5, 350:6, 351:20, 352:19, 353:18, 448:4</p> <p>licensed [8] - 344:4,</p>
---	--	---	--	---

<p>344:24, 345:5, 345:6, 345:7, 353:9, 354:18, 354:20 licensing [4] - 344:2, 344:3, 349:9, 349:13 lie [2] - 569:20, 569:21 life [15] - 370:15, 370:17, 371:10, 371:11, 398:16, 455:18, 455:20, 455:22, 455:25, 456:5, 456:9, 457:18, 505:4, 505:12 Life [1] - 337:7 likelihood [3] - 535:25, 573:19, 573:23 likely [7] - 361:14, 385:9, 440:13, 441:13, 503:14, 512:17, 536:2 limit [27] - 361:3, 380:18, 381:1, 417:2, 417:4, 417:16, 421:10, 421:19, 423:6, 424:14, 425:23, 429:10, 429:21, 429:22, 461:15, 462:21, 463:23, 467:15, 473:21, 474:11, 475:10, 475:24, 476:2, 476:4, 476:5, 500:14 limitation [1] - 462:10 limitations [1] - 401:12 limited [2] - 413:23, 507:21 limiting [1] - 455:16 Limits [1] - 340:16 limits [8] - 358:9, 416:23, 417:19, 460:9, 466:1, 472:25, 476:4, 575:17 Lindgrens [1] - 379:8 Line [1] - 333:23 line [24] - 347:17, 348:15, 349:11, 358:10, 373:7, 374:19, 375:7, 375:22, 396:3, 396:6, 396:21, 405:7, 405:12, 405:16, 405:22, 423:1, 424:1, 482:10, 482:14, 502:19, 526:12,</p>	<p>529:4, 530:21, 531:10 Lines [2] - 338:13, 338:14 lines [11] - 339:11, 349:9, 364:1, 366:21, 367:2, 405:6, 407:10, 483:24, 488:8, 542:8, 552:23 Linkletter [3] - 549:22, 549:24, 567:10 Lisbon [1] - 491:2 list [12] - 363:15, 365:22, 372:8, 383:7, 434:21, 439:12, 466:10, 471:6, 482:9, 530:6, 530:12, 530:17 listed [5] - 384:8, 434:19, 439:12, 468:10, 480:24 listen [1] - 532:17 listening [2] - 376:12, 535:20 lists [4] - 364:17, 364:20, 365:12, 481:1 Literature [2] - 335:7, 335:15 literature [12] - 425:6, 425:8, 425:21, 433:25, 444:16, 444:21, 450:16, 450:17, 451:12, 456:14, 459:17, 475:6 live [11] - 436:22, 439:15, 440:17, 446:22, 456:7, 464:13, 467:8, 467:9, 490:5, 492:7, 498:22 Living [1] - 337:8 living [21] - 434:1, 434:7, 436:18, 451:9, 453:7, 454:23, 456:5, 457:1, 457:4, 457:5, 457:10, 467:11, 488:13, 490:2, 491:12, 491:13, 491:24, 491:25, 492:1, 492:3, 492:13 LLC [2] - 328:4, 564:19 loading [1] - 342:12 local [1] - 506:1 locate [1] - 536:13 located [10] - 415:7,</p>	<p>426:15, 500:10, 505:17, 506:6, 512:12, 523:1, 564:3, 564:4, 579:3 location [10] - 392:9, 392:22, 417:19, 429:17, 501:11, 505:4, 507:25, 509:20, 514:23, 524:16 Locations [1] - 339:15 locations [9] - 357:4, 357:9, 359:3, 359:10, 386:4, 386:9, 512:17, 529:7, 577:17 locked [2] - 342:8, 342:11 look [69] - 350:24, 360:20, 366:23, 379:19, 381:17, 383:13, 395:1, 397:19, 398:17, 398:23, 402:19, 404:17, 413:4, 425:2, 425:22, 428:21, 438:11, 440:25, 453:18, 457:3, 464:12, 466:18, 468:25, 471:25, 475:1, 476:8, 479:10, 479:11, 479:12, 493:9, 500:4, 500:7, 500:9, 500:19, 501:3, 502:4, 502:13, 503:22, 507:9, 507:18, 508:25, 510:3, 510:18, 515:10, 524:18, 528:1, 532:19, 533:23, 533:24, 537:1, 544:10, 544:16, 544:24, 545:11, 546:24, 547:2, 547:5, 548:3, 549:4, 551:13, 554:3, 555:2, 563:16, 564:10, 565:14, 567:13 looked [27] - 353:16, 354:13, 374:10, 384:4, 384:7, 391:10, 391:11, 393:5, 393:20, 422:20, 425:11, 453:10, 488:12, 507:7, 507:17, 514:7, 515:7,</p>	<p>521:13, 524:1, 525:1, 525:3, 527:11, 527:13, 544:22, 559:1, 569:11, 581:9 looking [30] - 348:16, 354:15, 374:9, 378:13, 383:16, 393:7, 396:14, 402:4, 404:16, 405:2, 425:9, 440:23, 443:16, 444:15, 455:21, 464:11, 466:17, 468:15, 469:13, 484:18, 502:10, 509:17, 510:10, 512:18, 518:3, 520:23, 528:12, 535:7, 535:16, 564:25 looks [7] - 391:20, 393:8, 401:17, 467:4, 495:21, 563:8, 563:9 loop [5] - 550:16, 550:22, 559:25, 561:22, 569:2 loosely [1] - 402:16 loud [4] - 387:18, 453:14, 469:10, 531:21 louder [3] - 390:13, 490:18, 536:3 love [2] - 385:6, 536:19 Low [7] - 335:13, 335:15, 337:10, 339:3, 339:5, 340:11, 340:14 low [14] - 411:14, 425:3, 426:23, 434:24, 434:25, 435:6, 435:12, 452:24, 454:6, 454:9, 454:12, 469:10, 471:13, 573:23 Low-frequency [6] - 335:13, 335:15, 337:10, 339:3, 339:5, 340:14 lower [9] - 360:17, 368:6, 376:15, 376:25, 407:15, 427:23, 431:15, 488:19, 536:15 lowered [1] - 492:17 lunch [2] - 342:6, 494:4</p>	<p>lung [1] - 445:6 Lynch [1] - 391:2 Lyndon [1] - 415:17</p> <p>M</p> <p>ma'am [1] - 560:21 Madam [2] - 371:4, 578:3 magical [1] - 528:11 magnified [1] - 485:3 magnitude [1] - 435:9 mail [3] - 545:13, 545:16, 545:19 mails [1] - 370:16 Main [1] - 328:24 main [4] - 424:15, 452:21, 524:1, 554:18 maintain [1] - 460:4 maintenance [1] - 417:13 major [3] - 425:25, 433:21, 501:16 majority [1] - 473:3 males [2] - 505:6, 505:9 mammal [2] - 513:20, 513:23 man [1] - 350:23 managed [2] - 416:5, 447:21 management [7] - 424:14, 450:10, 497:18, 497:22, 498:3, 504:21, 508:8 Management [2] - 337:17, 337:20 manager [1] - 415:6 mandatory [1] - 413:7 manner [1] - 478:21 manufacturer [1] - 428:1 manufacturer's [1] - 390:19 manufacturers [1] - 390:14 Map [10] - 336:17, 336:17, 336:18, 336:19, 338:13, 338:14, 339:9, 339:10, 339:11, 340:23 map [37] - 363:24, 364:1, 366:21, 366:24, 367:3, 367:4, 367:13, 368:20, 369:3, 369:4, 375:18, 375:19, 375:21,</p>
--	--	---	---	--

<p>378:8, 392:10, 392:23, 506:6, 506:7, 506:8, 506:9, 544:15, 544:17, 544:19, 546:3, 546:6, 546:15, 546:22, 546:23, 546:24, 547:3, 576:12, 576:14, 576:22, 579:3, 579:4, 579:6, 581:19</p> <p>maps [7] - 350:15, 369:12, 370:6, 375:22, 378:18, 378:24, 547:5</p> <p>Maps [3] - 336:16, 338:11, 338:18</p> <p>March [7] - 338:10, 346:5, 346:18, 347:21, 348:25, 350:23, 531:7</p> <p>March-April [1] - 338:10</p> <p>MARK [1] - 331:7</p> <p>mark [4] - 348:12, 381:24, 382:4</p> <p>Mark [5] - 333:12, 334:22, 336:23, 401:2, 401:3</p> <p>marked [22] - 344:13, 355:20, 356:3, 356:6, 356:10, 356:11, 356:18, 356:19, 365:8, 366:3, 372:10, 381:7, 384:2, 395:25, 404:17, 416:10, 416:11, 433:6, 452:1, 452:8, 580:8, 580:9</p> <p>Mask [1] - 338:5</p> <p>Massachusetts [2] - 415:7, 417:9</p> <p>Massey [4] - 333:12, 335:5, 338:17, 579:22</p> <p>MASSEY [1] - 331:3</p> <p>master's [3] - 432:22, 450:23, 498:2</p> <p>match [1] - 406:3</p> <p>Match [2] - 337:12, 338:3</p> <p>material [4] - 369:8, 371:7, 568:9, 580:16</p> <p>Material [2] - 334:23, 335:4</p> <p>mating [1] - 505:5</p> <p>MATTER [1] - 328:4</p> <p>matter [10] - 329:2, 342:3, 346:5, 350:1,</p>	<p>352:5, 462:3, 538:20, 557:23, 561:19, 585:10</p> <p>matters [2] - 349:23, 570:1</p> <p>maximum [4] - 357:13, 360:4, 361:4, 411:23</p> <p>Maynard [1] - 415:7</p> <p>MCCOMSEY [1] - 585:5</p> <p>McComsey [3] - 328:24, 585:17, 585:18</p> <p>McCunney [9] - 337:16, 432:6, 432:12, 436:3, 453:1, 455:20, 455:21, 456:11, 489:18</p> <p>MCCUNNEY [1] - 331:18</p> <p>mean [29] - 378:22, 381:13, 386:22, 396:17, 427:12, 427:13, 428:14, 436:5, 437:3, 438:8, 440:16, 443:12, 444:25, 460:16, 465:18, 467:17, 470:5, 471:16, 479:9, 484:5, 487:16, 490:20, 491:11, 509:10, 534:17, 537:5, 564:7, 565:12, 568:21</p> <p>meaning [4] - 359:15, 359:25, 445:3, 502:19</p> <p>means [15] - 358:2, 359:7, 369:24, 399:21, 400:6, 427:14, 443:10, 486:17, 491:10, 506:2, 522:7, 525:15, 526:6, 537:17</p> <p>meant [1] - 437:10</p> <p>measure [6] - 407:1, 411:21, 429:10, 429:12, 468:20, 486:22</p> <p>measured [4] - 357:25, 412:13, 430:2, 435:7</p> <p>measurement [17] - 387:11, 389:8, 410:25, 411:11, 411:20, 416:6,</p>	<p>417:17, 418:12, 419:7, 425:2, 425:10, 427:24, 428:4, 436:7, 441:19, 441:20</p> <p>Measurement [2] - 335:13, 340:10</p> <p>measurements [13] - 389:1, 389:3, 406:19, 406:21, 406:24, 411:24, 415:13, 416:19, 417:23, 420:22, 435:13, 442:1, 454:9</p> <p>measures [2] - 453:9, 477:12</p> <p>Measures [2] - 335:8, 337:6</p> <p>Measuring [2] - 338:9, 340:12</p> <p>mechanical [3] - 343:2, 354:6, 490:12</p> <p>media [1] - 526:16</p> <p>Medical [1] - 432:14</p> <p>medical [4] - 432:24, 432:25, 433:1, 449:7</p> <p>medicine [5] - 433:1, 433:3, 446:3, 447:23, 447:25</p> <p>meet [2] - 457:15, 572:18</p> <p>meeting [6] - 410:4, 413:5, 457:14, 461:4, 495:15, 495:16</p> <p>meetings [2] - 548:23, 548:24</p> <p>meets [3] - 452:19, 554:16, 566:1</p> <p>Memo [1] - 333:22</p> <p>Memorandum [1] - 340:22</p> <p>memorandum [2] - 545:22, 546:1</p> <p>memory [2] - 495:13, 516:8</p> <p>Men [1] - 337:19</p> <p>mention [1] - 486:18</p> <p>mentioned [14] - 362:18, 428:1, 436:3, 465:6, 514:14, 518:24, 520:21, 522:2, 524:5, 542:10, 542:14, 577:10, 578:11, 578:17</p> <p>mentioning [1] - 524:12</p> <p>met [3] - 464:18, 557:22, 571:9</p>	<p>Meteorological [1] - 336:3</p> <p>meteorologists [1] - 343:24</p> <p>meter [1] - 467:4</p> <p>meters [6] - 411:12, 462:3, 462:9, 462:11, 477:20, 487:20</p> <p>method [3] - 436:12, 436:13, 533:14</p> <p>methodical [1] - 536:12</p> <p>methodology [11] - 409:1, 409:10, 409:11, 410:24, 411:2, 411:6, 411:8, 412:25, 417:18, 420:20, 571:15</p> <p>methods [6] - 436:17, 515:6, 516:5, 535:1, 535:3, 535:15</p> <p>metric [3] - 417:21, 468:12, 470:8</p> <p>mic [2] - 567:8, 581:18</p> <p>Michaud [4] - 466:21, 466:22, 466:25, 487:8</p> <p>mics [1] - 409:8</p> <p>mid [2] - 438:7, 438:14</p> <p>mid-2014 [1] - 459:20</p> <p>middle [1] - 342:16</p> <p>Midwest [2] - 455:14, 507:1</p> <p>might [20] - 354:15, 355:6, 366:16, 374:17, 392:16, 411:16, 425:9, 463:22, 474:19, 487:5, 495:21, 521:23, 530:21, 531:21, 532:13, 533:20, 537:24, 543:5, 560:1, 583:1</p> <p>Migration [1] - 333:24</p> <p>migration [3] - 522:13, 522:15, 523:12</p> <p>migratory [4] - 503:2, 503:3, 522:21, 523:13</p> <p>Mikal [12] - 328:22, 330:4, 330:6, 330:15, 330:16, 331:12, 331:16, 331:17, 331:24, 332:4, 332:6, 497:3</p> <p>MIKAL [36] - 352:15, 370:23, 375:16, 377:24, 381:2, 381:5, 381:23,</p>	<p>383:3, 384:16, 24 404:1, 407:6, 408:5, 408:12, 408:17, 409:5, 414:14, 418:9, 418:11, 421:23, 431:9, 431:21, 483:10, 483:19, 483:21, 485:6, 493:22, 494:23, 495:9, 495:18, 497:2, 499:7, 499:12, 511:19, 538:9, 539:22, 540:10</p> <p>mile [41] - 458:1, 458:2, 464:14, 506:16, 506:17, 506:20, 506:22, 509:5, 509:16, 511:9, 512:8, 512:12, 512:15, 512:19, 520:16, 521:18, 521:19, 521:20, 521:25, 522:6, 527:8, 527:9, 527:21, 527:23, 528:5, 528:6, 528:10, 528:20, 528:23, 531:3, 533:15, 537:10, 538:23, 538:25, 539:2, 562:22, 563:24, 564:3, 564:4</p> <p>miles [21] - 391:22, 392:4, 392:6, 393:1, 393:11, 426:15, 427:2, 453:8, 456:7, 457:4, 457:10, 458:4, 467:9, 513:4, 521:23, 527:9, 527:25, 528:5, 539:8, 577:13</p> <p>Miles [2] - 328:19, 512:3</p> <p>military [1] - 450:25</p> <p>Miller [1] - 572:18</p> <p>million [2] - 474:7, 486:11</p> <p>mind [4] - 372:5, 405:14, 428:21, 510:16</p> <p>minds [1] - 410:4</p> <p>mine [2] - 354:19, 583:3</p> <p>mini [1] - 384:24</p> <p>minimal [3] - 357:23, 380:20, 536:1</p> <p>minimize [10] - 500:16, 500:23, 501:18, 502:1,</p>
---	---	---	--	---

502:6, 519:16, 520:3, 523:20, 524:3, 526:7 minimized [3] - 521:9, 521:14, 523:24 Minimizing [1] - 333:23 minimizing [2] - 523:17, 570:4 minimum [4] - 412:5, 462:3, 557:6, 557:9 Minnesota [5] - 339:8, 344:5, 350:5, 393:23, 432:23 minor [2] - 434:7, 440:8 minus [1] - 582:20 minute [4] - 378:17, 392:12, 571:6, 571:24 minutes [6] - 342:8, 352:7, 352:9, 361:8, 410:9, 524:5 mirror [1] - 409:1 Mishaud [1] - 467:7 misleading [1] - 354:2 misled [1] - 377:21 misrepresentation [1] - 374:16 misrepresented [1] - 350:19 misrepresenting [1] - 389:10 miss [1] - 399:16 missed [1] - 409:22 missing [2] - 473:17, 576:19 misunderstand [1] - 564:6 misunderstood [1] - 386:1 mitigate [1] - 424:15 mitigation [3] - 361:11, 416:7, 526:6 MN [2] - 341:4, 341:5 mode [1] - 359:14 model [23] - 357:4, 357:8, 357:12, 358:5, 359:1, 360:11, 360:14, 363:4, 390:15, 391:15, 398:12, 399:3, 399:12, 399:14, 399:19, 403:3, 419:14, 427:22, 427:23, 429:7, 429:14, 429:16, 429:24 modeled [8] - 358:1, 376:22, 397:25, 401:12, 419:3, 428:3, 430:1, 460:8 modeling [29] - 349:24, 351:14, 351:24, 363:2, 372:24, 390:5, 390:12, 391:11, 393:17, 401:18, 416:6, 418:19, 418:23, 419:4, 419:6, 419:10, 419:13, 426:12, 426:19, 426:25, 427:1, 427:8, 427:17, 429:20, 431:17, 431:18, 469:1, 469:2, 478:14 Modeling [2] - 333:8, 333:8 models [3] - 359:13, 391:24, 492:15 modification [1] - 413:23 modifications [3] - 411:6, 498:22, 498:24 modified [3] - 411:3, 411:5, 411:21 Mogen [2] - 391:6, 392:3 Mogen's [2] - 334:11, 393:6 moment [7] - 397:6, 412:12, 516:22, 517:18, 544:16, 567:15, 575:6 Monday [2] - 577:2, 577:4 money [1] - 388:13 monitor [5] - 441:19, 467:6, 509:2, 509:5, 512:15 monitored [2] - 342:7, 425:12 monitoring [30] - 387:8, 388:15, 388:24, 393:25, 417:13, 423:7, 423:10, 424:9, 460:7, 468:19, 468:21, 478:14, 505:24, 508:12, 509:12, 509:24, 509:25, 512:8, 512:19, 525:13, 526:2, 530:25, 531:1, 532:25, 533:8, 536:22, 537:5, 556:18, 563:25, 567:18 Monitoring [1] - 340:7 month [7] - 360:22, 399:3, 505:10, 531:20, 566:18, 583:15 months [2] - 394:10, 394:11 morning [19] - 342:1, 363:15, 379:7, 384:21, 384:22, 390:2, 390:3, 404:9, 410:22, 426:11, 439:20, 439:21, 509:22, 510:2, 531:25, 535:23, 536:8, 575:15, 575:17 most [30] - 357:12, 357:22, 362:9, 365:16, 388:10, 397:25, 398:4, 398:5, 398:6, 401:8, 406:21, 428:12, 430:20, 431:14, 436:16, 436:21, 453:2, 454:1, 456:2, 466:19, 473:6, 503:16, 510:2, 514:17, 514:25, 519:3, 520:22, 522:23, 525:14 mostly [3] - 435:4, 448:16, 530:20 motion [2] - 355:5, 496:15 Mountain [1] - 334:3 Mountain-Prairie [1] - 334:3 move [10] - 349:15, 350:12, 350:18, 351:7, 377:4, 403:17, 475:20, 525:13, 576:4, 584:16 moved [8] - 377:4, 403:14, 512:18, 526:24, 529:5, 576:1, 576:3, 576:4 movement [4] - 364:1, 380:15, 386:11, 582:13 movements [1] - 405:18 Moves [2] - 339:10, 339:12 moves [8] - 363:24, 364:7, 364:15, 364:23, 377:19, 406:4, 424:20, 582:9 moving [11] - 364:18, 378:2, 394:15, 403:8, 424:17, 484:17, 529:5, 529:6, 529:7, 556:16, 561:21 MR [224] - 342:19, 342:23, 344:14, 344:22, 345:2, 345:4, 345:9, 345:11, 346:1, 346:4, 346:9, 346:18, 347:6, 347:12, 347:21, 348:2, 348:6, 348:12, 348:14, 348:21, 349:2, 349:7, 349:10, 349:17, 351:10, 352:4, 352:15, 355:3, 355:11, 363:6, 363:8, 363:12, 363:14, 363:21, 363:23, 364:8, 364:16, 364:24, 365:2, 365:4, 365:7, 366:5, 366:10, 366:13, 366:20, 366:23, 367:1, 367:6, 367:12, 367:15, 367:19, 367:22, 368:5, 368:9, 368:16, 368:19, 369:1, 369:6, 369:11, 369:16, 370:11, 370:23, 371:2, 371:4, 372:11, 372:16, 374:25, 375:16, 377:16, 377:17, 377:24, 377:25, 381:2, 381:5, 381:23, 382:25, 383:3, 384:1, 384:16, 395:24, 401:25, 402:2, 403:12, 403:21, 403:23, 404:1, 404:4, 404:13, 404:15, 407:3, 407:6, 407:24, 408:5, 408:12, 408:17, 409:5, 409:9, 409:23, 414:10, 414:12, 414:14, 414:22, 415:2, 418:1, 418:6, 418:9, 418:11, 421:23, 430:25, 431:5, 431:9, 431:21, 431:25, 432:6, 432:9, 25 435:19, 435:23, 447:4, 447:8, 449:19, 450:1, 450:4, 458:9, 458:13, 458:15, 467:23, 467:25, 482:10, 482:17, 482:20, 483:7, 483:10, 483:19, 483:21, 485:6, 493:17, 493:20, 493:22, 494:7, 494:13, 494:20, 494:23, 495:9, 495:18, 495:25, 496:4, 496:7, 496:23, 497:2, 499:7, 499:12, 511:19, 511:23, 512:2, 513:8, 513:12, 513:14, 517:22, 518:7, 538:9, 539:22, 540:2, 540:6, 540:10, 543:25, 544:4, 544:6, 546:11, 548:12, 551:4, 551:6, 551:21, 551:24, 555:10, 555:12, 557:17, 557:21, 560:12, 560:21, 561:3, 574:4, 574:7, 574:21, 575:12, 576:9, 576:11, 576:14, 576:17, 576:18, 576:24, 577:1, 577:4, 577:6, 577:7, 577:12, 577:14, 578:3, 578:5, 578:9, 578:11, 578:15, 578:16, 578:20, 578:22, 578:24, 578:25, 579:1, 579:2, 579:4, 579:6, 579:8, 579:9, 579:12, 579:22, 580:2, 580:9, 580:12, 581:21, 581:25, 582:3, 582:5, 582:14, 582:23, 583:2 MS [192] - 342:1, 344:21, 348:20, 349:8, 349:11, 351:9, 352:7, 352:9, 352:12, 353:4, 354:24, 355:10, 363:7, 363:18, 	
--	--

363:22, 365:6, 366:9, 366:12, 370:10, 370:22, 371:3, 372:4, 372:13, 375:13, 378:5, 381:4, 381:6, 382:1, 383:24, 384:18, 392:14, 392:17, 392:19, 401:24, 403:19, 403:22, 403:24, 404:2, 404:6, 404:10, 407:4, 407:7, 407:23, 407:25, 408:2, 408:6, 408:16, 410:8, 410:14, 414:6, 414:11, 414:13, 414:17, 414:21, 418:4, 418:7, 421:25, 430:24, 431:2, 431:6, 431:23, 432:1, 432:5, 435:21, 435:24, 436:2, 438:21, 438:22, 438:25, 447:3, 447:5, 447:9, 447:11, 447:13, 449:16, 449:18, 449:20, 449:24, 458:11, 468:3, 482:15, 482:18, 482:21, 483:8, 483:11, 483:15, 483:18, 485:8, 493:14, 493:16, 493:18, 493:21, 493:23, 494:3, 494:5, 494:9, 494:14, 494:21, 495:4, 495:17, 495:23, 496:2, 496:5, 496:8, 496:14, 496:25, 499:10, 511:21, 513:10, 518:8, 538:7, 538:18, 539:24, 540:4, 540:8, 540:11, 540:17, 540:19, 540:21, 540:23, 541:2, 542:21, 543:21, 543:23, 544:2, 545:4, 546:12, 548:13, 548:19, 550:12, 550:14, 551:2, 551:3, 551:23, 551:25, 552:2, 552:3, 552:7, 552:9,	552:12, 555:4, 555:8, 555:13, 557:12, 557:15, 557:18, 560:10, 560:18, 560:24, 562:12, 571:22, 571:24, 572:1, 572:2, 572:4, 572:6, 572:9, 573:25, 574:2, 574:5, 574:8, 574:12, 574:13, 574:14, 574:16, 574:17, 574:19, 575:5, 576:6, 576:7, 576:10, 577:3, 577:8, 578:4, 579:10, 579:13, 579:14, 579:24, 579:25, 580:6, 580:8, 580:11, 581:1, 581:3, 581:6, 581:14, 581:23, 582:1, 582:15, 582:16, 582:17, 583:6 multiple [5] - 349:19, 436:12, 436:19, 510:21, 554:10 municipalities [1] - 421:2 Murphy [10] - 328:19, 330:4, 330:18, 330:20, 331:4, 331:8, 331:19, 331:23, 577:9, 581:17 MURPHY [31] - 409:23, 432:6, 432:9, 435:19, 447:4, 449:19, 450:1, 450:4, 458:9, 467:23, 467:25, 482:10, 482:17, 493:17, 494:7, 555:10, 557:17, 574:4, 574:21, 575:12, 576:9, 576:14, 576:18, 577:1, 577:6, 577:12, 579:22, 581:21, 582:5, 582:23, 583:2 must [2] - 567:11, 583:13 mute [1] - 496:2 myocardial [1] - 466:6 N name [26] - 342:24, 343:1, 345:14,	345:15, 345:19, 345:25, 347:15, 353:20, 363:20, 374:23, 384:14, 415:3, 415:5, 432:10, 432:12, 450:5, 489:23, 496:22, 497:5, 497:6, 499:25, 504:9, 511:15, 541:3, 552:13 names [1] - 499:25 narrow [1] - 360:6 NARUC [1] - 340:12 National [1] - 337:5 national [2] - 343:15, 385:1 Native [1] - 548:22 native [5] - 524:23, 529:10, 581:19, 582:7, 582:8 nature [9] - 374:5, 387:17, 389:16, 417:15, 423:20, 443:22, 532:7, 582:4, 582:5 ND [2] - 341:3, 341:4 near [7] - 434:2, 434:7, 434:25, 436:22, 437:19, 491:12, 492:13 nearby [1] - 467:11 nearest [1] - 364:18 nearily [1] - 351:13 nearsightedness [1] - 367:24 necessarily [5] - 365:25, 419:6, 427:16, 429:18, 443:12 necessary [5] - 344:10, 416:21, 435:11, 494:20, 573:5 necessity [3] - 406:20, 518:19, 539:3 need [27] - 342:10, 357:11, 372:5, 388:6, 388:12, 392:10, 402:19, 409:2, 409:3, 410:9, 411:11, 414:13, 421:16, 452:21, 473:1, 473:9, 482:4, 495:4, 495:6, 498:24, 518:16, 542:14, 554:12, 564:12, 565:14, 566:3, 581:11 needed [7] - 347:19,	353:18, 353:19, 373:6, 477:9, 478:1, 559:11 needs [6] - 408:10, 411:13, 443:24, 444:1, 444:23, 446:16 negate [1] - 374:23 negotiate [3] - 567:22, 569:19, 569:20 negotiations [3] - 561:16, 580:13, 580:20 neighboring [2] - 361:19, 380:17 Nelson [13] - 392:20, 409:24, 410:17, 438:23, 493:14, 526:12, 526:20, 527:10, 530:22, 532:24, 533:6, 548:15, 584:18 NELSON [45] - 328:12, 355:7, 390:2, 390:4, 390:15, 390:21, 390:24, 391:18, 391:21, 391:25, 392:7, 392:13, 392:25, 393:9, 393:13, 394:4, 408:20, 410:6, 410:18, 412:20, 413:12, 414:1, 426:9, 427:3, 438:24, 493:15, 496:11, 526:11, 526:16, 527:1, 528:16, 529:1, 532:23, 534:3, 534:11, 548:16, 570:20, 571:13, 571:18, 582:18, 582:25, 583:5, 584:9, 584:16, 584:19 Nest [1] - 333:6 Netherlands [4] - 435:3, 490:4, 490:6, 491:5 neurologist [2] - 448:9, 448:12 neurologists [2] - 447:21, 448:7 never [12] - 345:7, 348:4, 353:13, 394:2, 406:19, 407:1, 437:16, 446:3, 492:19, 545:4, 580:6 nevertheless [1] -	561:15 new [8] - 363:9, 374:15, 482:14, 529:12, 529:16, 529:18, 529:20, 555:24 New [1] - 468:24 Newspapers [1] - 337:23 next [14] - 342:17, 349:15, 424:20, 429:15, 432:5, 449:25, 470:12, 536:18, 546:3, 552:7, 560:6, 566:18, 574:12, 581:22 NextEra [2] - 564:14, 564:19 Night [1] - 340:20 night [10] - 342:15, 389:12, 467:20, 468:6, 468:12, 468:17, 469:5, 469:13, 470:8, 488:7 night's [2] - 489:3, 490:21 nights [1] - 469:8 nighttime [3] - 468:11, 469:12, 486:7 nine [5] - 456:3, 497:13, 499:19, 514:3, 530:2 nobody [2] - 369:25, 489:14 nobody's [1] - 492:13 Nocebo [3] - 337:19, 337:21, 337:22 Noise [22] - 335:8, 335:11, 335:12, 335:13, 335:15, 335:17, 335:20, 337:4, 337:5, 337:9, 337:10, 338:10, 339:4, 339:4, 339:5, 339:6, 339:8, 340:14, 340:16, 340:19, 340:20 noise [97] - 343:7, 344:1, 346:16, 357:5, 357:25, 358:9, 362:22, 363:5, 365:22, 376:18, 378:15, 378:17, 378:25, 384:12, 385:25, 386:23, 388:3, 388:4, 388:5, 388:8, 388:9, 388:18, 389:12, 389:19,
--	---	--	--	---

<p>389:21, 389:24, 390:13, 390:19, 404:22, 405:25, 410:25, 416:7, 421:14, 426:2, 433:24, 434:2, 434:5, 434:6, 434:10, 435:7, 435:9, 435:13, 435:16, 436:24, 437:25, 438:3, 438:4, 438:5, 438:7, 438:15, 440:6, 442:8, 442:13, 443:10, 444:1, 444:5, 444:24, 444:25, 448:24, 451:23, 452:23, 454:6, 454:9, 454:13, 455:3, 456:18, 460:8, 464:21, 464:22, 465:24, 466:9, 466:12, 467:16, 467:19, 467:20, 468:6, 468:11, 471:12, 471:19, 475:9, 478:13, 478:14, 478:24, 479:23, 483:1, 483:2, 488:1, 488:24, 489:2, 489:8, 489:11, 489:12, 536:3, 536:9 none [13] - 393:24, 408:5, 408:7, 408:8, 431:5, 485:10, 493:20, 493:22, 539:1, 540:10, 552:2, 574:7 nonexistent [1] - 503:25 nonfactor [1] - 445:21 nongame [1] - 497:20 nonparticipant [1] - 364:22 Nonparticipants [1] - 339:13 nonparticipants [10] - 365:23, 406:1, 431:11, 433:20, 435:15, 454:3, 457:19, 465:2, 467:12, 492:21 nonparticipating [13] - 358:10, 358:12, 361:5, 460:22, 463:14, 464:22, 472:12, 474:12, 481:7, 481:15,</p>	<p>481:22, 482:8, 483:2 nonparticipants [2] - 460:14, 461:16 noon [1] - 583:9 normal [4] - 370:17, 371:10, 371:11, 519:7 North [7] - 344:4, 350:6, 350:9, 451:14, 451:21, 514:2, 514:8 northeast [5] - 392:8, 504:4, 539:17, 546:22, 551:9 northeastern [4] - 547:9, 547:13, 547:20, 548:1 northeasternmost [2] - 516:17, 516:23 Northwestern [1] - 433:1 notably [1] - 435:4 Notary [2] - 585:7, 585:18 note [3] - 367:9, 402:18, 428:5 noted [2] - 435:10, 581:1 notes [5] - 379:17, 397:19, 399:16, 571:25, 575:9 Notes [2] - 335:20, 335:22 nothing [10] - 370:12, 404:4, 406:5, 540:2, 543:21, 561:7, 563:12, 583:6, 583:20 notice [3] - 555:5, 555:11, 555:14 Notice [1] - 336:11 NOTICE [1] - 340:8 noticed [1] - 477:2 notified [1] - 568:23 notion [1] - 457:12 November [6] - 516:7, 516:12, 516:15, 516:20, 517:16, 517:17 nuance [1] - 461:19 nuances [1] - 467:18 nuisance [1] - 455:2 number [67] - 354:18, 355:15, 357:3, 357:11, 359:2, 359:12, 360:23, 376:14, 383:23, 383:25, 396:4, 396:15, 399:5, 399:6, 399:8, 399:9,</p>	<p>399:19, 400:13, 400:18, 400:24, 402:4, 404:17, 411:17, 411:23, 412:18, 412:24, 418:21, 420:22, 425:23, 427:23, 428:3, 431:11, 451:10, 451:15, 456:1, 461:3, 466:10, 466:17, 467:13, 472:17, 473:15, 473:23, 474:19, 477:14, 487:18, 488:10, 491:18, 492:21, 492:23, 500:20, 501:8, 509:16, 510:14, 523:16, 525:13, 528:7, 536:7, 543:1, 543:11, 571:1, 572:13, 575:12, 578:8, 578:14, 582:12 numbered [5] - 395:13, 470:18, 470:22, 472:3, 487:14 numbers [17] - 386:4, 391:13, 394:3, 394:12, 395:13, 407:14, 426:23, 428:2, 488:9, 488:10, 501:14, 504:3, 529:12, 536:15, 577:11, 577:15, 579:5 numerous [2] - 436:20, 474:10</p>	<p>366:11, 372:2, 372:3, 372:5, 372:6, 403:23, 404:1, 467:23, 467:25, 468:4, 482:10, 482:15, 496:1, 496:7, 496:9, 555:9, 555:10, 555:12, 560:10, 560:18, 576:6, 577:7, 579:10, 579:24, 581:4, 581:5, 582:2, 582:14, 582:16 objections [2] - 344:18, 344:20 Objective [2] - 335:8, 337:6 objective [6] - 402:24, 441:17, 441:21, 441:25, 453:9, 477:12 observations [1] - 515:22 observed [3] - 423:20, 493:6, 528:18 obtained [4] - 413:9, 441:16, 441:18, 498:2 obviously [10] - 385:4, 386:6, 389:15, 391:25, 421:20, 441:3, 486:14, 486:16, 526:21, 527:13 occasion [1] - 461:6 occasionally [2] - 389:14, 568:19 occupation [1] - 497:5 occupational [3] - 433:2, 445:2, 447:25 occupied [4] - 358:12, 358:13, 376:18, 397:1 occupy [1] - 376:9 occur [10] - 376:25, 470:13, 471:16, 473:5, 489:6, 502:3, 534:1, 569:1, 569:2 occurred [4] - 356:16, 393:23, 516:20, 580:22 occurs [3] - 505:22, 531:24, 550:17 October [2] - 339:7, 459:21 odds [1] - 443:16 OF [6] - 328:2, 328:4, 328:5, 585:1, 585:3 offending [1] - 380:25 offer [19] - 366:6,</p>	<p>366:11, 413:21, 27 435:19, 458:9, 501:4, 503:24, 504:14, 510:17, 517:11, 519:8, 521:17, 524:14, 527:17, 528:6, 531:12, 532:8, 532:14, 580:10 offered [13] - 344:16, 370:9, 403:16, 413:19, 499:9, 521:11, 522:6, 527:18, 528:2, 528:24, 575:8, 580:5, 580:7 offering [1] - 577:11 office [3] - 551:14, 562:16, 566:15 often [7] - 429:7, 430:1, 471:5, 471:12, 471:14, 504:24, 524:21 oftentimes [1] - 354:5 Ohio [1] - 338:24 old [2] - 453:18, 549:21 older [2] - 492:14 OLLSON [1] - 331:22 Olson [10] - 335:6, 335:6, 337:4, 340:20, 340:21, 340:21, 450:1, 450:7, 450:9, 458:16 Olson's [2] - 422:9, 422:13 Olson [8] - 340:5, 540:23, 541:3, 541:5, 544:7, 549:8, 551:7, 552:3 OLSON [1] - 332:7 on/off [1] - 412:23 once [4] - 360:10, 383:1, 472:19, 570:13 one [142] - 346:24, 360:14, 361:7, 361:10, 362:24, 367:7, 368:11, 380:20, 384:6, 388:17, 389:11, 393:6, 394:2, 399:19, 399:24, 400:10, 400:19, 400:20, 400:21, 400:22, 402:23, 406:7, 408:17, 408:18, 417:10, 419:20, 423:1, 424:25, 425:1,</p>
O				
<p>O&M [1] - 542:8 o'clock [1] - 494:3 O-L-L-S-O-N [1] - 450:7 oath [8] - 342:21, 410:15, 414:24, 432:7, 450:2, 496:24, 540:24, 552:10 object [6] - 344:15, 348:14, 370:7, 496:13, 580:13, 580:23 objected [1] - 403:16 objection [37] - 349:2, 349:16, 349:18, 351:18, 354:25, 355:2, 355:4,</p>				

<p>426:14, 430:5, 430:13, 436:3, 439:11, 440:5, 441:15, 445:5, 446:15, 446:18, 447:22, 449:11, 454:8, 456:4, 456:13, 458:6, 459:14, 461:6, 463:25, 468:17, 475:3, 475:5, 475:17, 477:16, 479:25, 480:15, 481:14, 487:8, 488:5, 489:9, 489:19, 489:24, 490:1, 500:18, 502:4, 506:16, 506:22, 507:6, 507:8, 507:20, 508:1, 509:4, 509:16, 509:21, 510:14, 510:23, 511:4, 511:9, 512:3, 512:8, 512:12, 512:15, 512:19, 512:22, 513:17, 514:16, 518:15, 518:25, 520:16, 520:17, 520:21, 520:22, 521:3, 521:16, 521:17, 521:18, 521:20, 521:25, 522:6, 522:18, 522:22, 524:5, 524:8, 524:18, 525:13, 526:13, 527:8, 527:9, 528:6, 528:10, 528:17, 528:20, 528:22, 528:23, 529:6, 530:15, 531:2, 532:5, 534:12, 537:10, 539:2, 542:14, 545:4, 548:20, 550:2, 554:5, 563:24, 564:3, 564:4, 565:24, 573:2, 573:4, 575:1, 576:18, 578:5, 578:22, 579:14, 581:10, 581:17, 581:18, 584:2 one's [1] - 471:23 one-hour [1] - 468:17 one-mile [7] - 506:22, 509:16, 521:18, 521:25, 522:6, 527:8, 528:6</p>	<p>one-third [1] - 528:20 onerous [1] - 413:25 ones [12] - 363:9, 372:9, 378:24, 382:22, 421:9, 430:20, 480:25, 509:4, 523:1, 532:10, 537:12, 577:9 ongoing [1] - 505:23 Onida [2] - 328:24, 585:13 Ontario [4] - 337:23, 462:10, 462:16, 476:2 open [7] - 342:6, 342:13, 461:4, 468:4, 483:23, 484:2, 584:5 open-ended [1] - 468:4 opening [4] - 484:24, 494:14, 494:15, 494:18 operate [1] - 575:19 operating [7] - 357:13, 359:24, 411:11, 412:1, 412:6, 424:20, 425:13 Operation [1] - 334:6 operation [3] - 424:16, 471:3, 525:9 operational [6] - 360:24, 526:6, 531:17, 531:22, 532:2, 532:7 operations [1] - 444:11 operator [1] - 417:3 opine [3] - 448:18, 448:19, 462:10 opinion [11] - 411:5, 416:18, 416:20, 419:19, 420:13, 425:16, 474:14, 509:11, 553:13, 561:20, 570:16 opinions [1] - 424:23 opportunity [15] - 344:19, 352:12, 401:21, 446:14, 446:17, 515:9, 515:11, 519:20, 531:10, 531:16, 558:21, 559:6, 562:2, 567:21, 569:4 opposite [1] - 427:14 opposition [1] - 370:9 Optical [2] - 335:21, 335:22</p>	<p>option [1] - 495:18 Option [1] - 339:16 optional [1] - 575:15 options [2] - 361:14, 577:10 oral [1] - 583:10 order [10] - 342:2, 389:5, 411:19, 494:5, 534:4, 534:6, 537:4, 554:12, 554:23, 583:13 ordered [1] - 554:8 orders [1] - 435:9 ordinance [18] - 358:17, 358:22, 362:19, 362:21, 365:17, 401:12, 405:11, 405:21, 406:2, 407:11, 421:4, 421:6, 431:13, 450:15, 455:16, 457:15, 565:11, 571:9 ordinances [14] - 358:21, 362:4, 388:2, 401:6, 401:9, 405:24, 421:7, 453:18, 455:12, 464:7, 464:9, 473:7, 473:9, 565:16 ordinarily [2] - 568:13, 568:15 Organization [6] - 438:12, 461:17, 467:15, 467:19, 469:5, 475:22 Original [1] - 336:23 original [7] - 355:25, 391:13, 408:23, 413:5, 413:18, 576:21, 581:19 originally [1] - 582:7 otherwise [4] - 345:5, 345:9, 384:2, 581:10 outbuildings [1] - 359:23 outcome [4] - 361:24, 436:7, 436:15, 532:6 Outcomes [1] - 337:20 outcomes [1] - 532:14 outline [1] - 497:15 Outline [1] - 334:3 outlined [1] - 417:1 output [1] - 357:14 outside [8] - 472:11, 484:15, 485:3, 485:4, 488:9, 491:17, 498:22, 521:25</p>	<p>outstanding [6] - 542:13, 574:24, 575:4, 575:25, 581:17, 581:18 overall [6] - 403:8, 500:10, 502:10, 508:6, 513:6, 520:10 overlooked [1] - 373:6 overly [2] - 413:24, 469:20 overrule [4] - 354:25, 372:4, 496:16, 560:24 overruled [3] - 355:7, 355:8, 355:9 oversee [2] - 497:18, 498:8 overview [6] - 343:8, 367:3, 415:14, 432:19, 450:19, 469:22 Overview [2] - 338:13, 338:14 own [9] - 369:23, 371:21, 442:9, 475:23, 564:15, 564:20, 564:23, 565:6 owner [3] - 417:2, 450:8, 563:6</p>	<p>P</p> <p>P.E [10] - 345:15, 345:19, 345:25, 347:15, 372:21, 372:25, 374:13, 374:20, 374:22, 375:9 p.m [2] - 342:11, 584:24 pacemakers [1] - 444:8 Package [1] - 339:17 package [5] - 419:17, 420:1, 575:20, 577:22, 582:19 packages [3] - 374:11, 419:20, 419:21 packs [1] - 445:7 PAGE [4] - 330:2, 330:7, 331:2, 332:2 page [46] - 353:23, 354:17, 395:13, 395:14, 396:4, 396:5, 396:6, 396:15, 396:16, 404:17, 422:24, 437:22, 460:18, 462:25, 470:19, 472:1, 472:3, 472:4, 28 475:8, 476:7, 476:8, 478:2, 480:13, 480:16, 480:17, 486:20, 490:1, 544:11, 544:13, 545:12, 545:22, 546:1, 546:3, 546:13, 546:19, 546:23, 546:25, 547:3, 547:12, 547:16, 547:21, 548:10, 575:14 paged [1] - 404:18 pages [3] - 487:14, 490:1 Pages [1] - 328:9 paid [2] - 441:9, 444:10 Paige [3] - 340:5, 540:23, 541:5 PAIGE [1] - 332:7 pain [2] - 394:9, 394:13 Pamidighantam [1] - 340:13 Panel [1] - 338:8 paper [9] - 454:8, 463:1, 463:3, 472:6, 478:17, 480:5, 480:12, 489:22, 518:19 papers [7] - 372:20, 424:25, 452:17, 454:4, 456:3, 466:22, 514:17 paperwork [3] - 350:16, 373:11, 373:17 Papio [1] - 339:16 paragraph [9] - 460:19, 475:16, 476:9, 476:12, 478:6, 480:14, 480:17, 480:19, 543:1 parameter [3] - 546:20, 547:14, 547:15 Parameters [1] - 335:11 parcel [1] - 376:18 pardon [1] - 382:16 parents [1] - 550:5 Parks [11] - 495:1, 495:16, 497:8, 497:11, 499:14, 499:17, 505:15, 506:10, 562:20, 563:9, 563:17</p>
--	---	---	--	--

Parks's ^[1] - 511:2 part ^[51] - 349:14, 353:12, 367:3, 368:20, 369:14, 370:15, 370:17, 370:21, 371:10, 371:11, 373:5, 379:8, 389:8, 406:12, 413:21, 416:23, 417:5, 478:8, 498:4, 498:7, 501:12, 502:21, 502:25, 503:24, 504:4, 505:4, 505:5, 505:12, 511:10, 514:25, 515:15, 515:23, 518:22, 519:25, 524:7, 524:11, 524:15, 530:17, 530:23, 536:14, 538:16, 539:17, 547:24, 547:25, 548:1, 548:24, 550:9, 552:21, 562:8, 573:12 Partial ^[1] - 340:18 participant ^[2] - 400:21, 400:22 participants ^[1] - 454:3 Participants ^[1] - 337:8 participate ^[3] - 461:1, 562:2, 584:13 participated ^[2] - 384:24, 584:1 participating ^[5] - 358:13, 361:5, 361:8, 361:16, 581:10 participation ^[2] - 357:10, 427:7 Participation ^[6] - 333:20, 333:21, 334:24, 335:5, 341:8, 341:9 particular ^[46] - 359:4, 367:1, 403:7, 409:25, 421:11, 425:12, 426:13, 426:22, 429:14, 429:23, 444:13, 444:15, 470:24, 500:18, 501:17, 502:8, 503:2, 503:3, 503:8, 503:18, 503:23, 504:7, 505:6, 509:8, 510:10, 514:10,	514:19, 515:20, 521:1, 521:10, 522:22, 522:24, 522:25, 523:5, 523:14, 524:21, 524:25, 525:19, 527:12, 528:25, 530:17, 531:13, 531:18, 531:23, 534:24, 536:14 particularly ^[3] - 387:18, 423:3, 503:5 parties ^[8] - 347:8, 368:2, 377:22, 495:6, 556:9, 575:7, 583:17, 584:10 partner ^[1] - 343:2 partridge ^[1] - 504:18 parts ^[3] - 529:6, 529:7, 536:16 party ^[2] - 367:16, 568:1 pass ^[4] - 350:12, 360:17, 371:23, 372:11 passed ^[5] - 347:3, 394:10, 420:9, 555:6, 556:4 past ^[13] - 398:21, 409:24, 413:14, 420:2, 428:13, 454:11, 456:25, 469:6, 549:2, 555:23, 565:2, 567:4 pasturing ^[1] - 530:8 paths ^[1] - 542:7 patients ^[2] - 444:17, 448:11 Pattern ^[2] - 337:11, 338:3 patterns ^[2] - 487:22, 492:5 Paul ^[1] - 340:13 Paulson ^[3] - 542:21, 574:14, 574:16 peak ^[1] - 531:23 Pedersen ^[5] - 476:15, 476:16, 476:22, 477:11, 489:23 Pedersen's ^[1] - 489:24 pediatrics ^[1] - 448:16 peek ^[1] - 381:8 peer ^[6] - 425:7, 433:25, 451:11, 452:17, 459:23, 474:24 peer-reviewed ^[6] - 425:7, 433:25, 451:11, 452:17,	459:23, 474:24 pen ^[1] - 382:2 pendency ^[1] - 550:15 pending ^[5] - 575:16, 577:16, 578:6, 578:13, 578:18 Pending ^[1] - 339:15 People ^[1] - 340:15 people ^[79] - 351:14, 354:5, 354:7, 354:8, 371:14, 371:20, 379:19, 380:17, 406:21, 424:6, 434:1, 434:4, 434:7, 434:11, 435:5, 436:18, 436:22, 436:25, 437:4, 437:8, 439:25, 440:3, 440:6, 440:7, 440:9, 440:17, 440:25, 441:3, 441:4, 441:7, 442:7, 442:9, 443:11, 443:14, 443:16, 443:20, 443:21, 444:6, 444:18, 446:22, 446:24, 449:1, 453:6, 457:4, 467:1, 467:3, 476:24, 477:20, 485:4, 486:16, 487:17, 487:18, 488:6, 488:10, 488:13, 488:17, 489:15, 490:2, 490:3, 490:5, 490:7, 490:10, 490:11, 490:12, 490:16, 490:21, 491:7, 491:11, 491:12, 491:19, 491:22, 491:24, 491:25, 492:1, 519:1, 546:15, 549:25, 565:20 people's ^[7] - 453:14, 453:17, 453:24, 455:4, 477:21, 489:1, 492:22 per ^[10] - 360:22, 361:4, 361:9, 361:11, 398:25, 411:12, 443:11, 520:24, 555:19 percent ^[20] - 359:24, 399:8, 400:5, 430:17, 456:12, 456:25, 457:6, 457:9, 457:10, 464:15, 488:13,	488:16, 489:13, 490:10, 490:11, 490:12, 521:9, 521:15, 524:14 percentage ^[1] - 488:11 perceptions ^[1] - 487:21 Perceptual ^[1] - 335:17 perfect ^[3] - 407:18, 487:12, 583:5 perform ^[1] - 515:3 Performance ^[2] - 338:9, 340:12 performed ^[1] - 393:25 perhaps ^[10] - 367:23, 392:2, 427:17, 427:19, 428:3, 448:6, 460:16, 492:11, 566:9, 569:19 perimeter ^[2] - 357:25, 358:1 period ^[11] - 399:1, 411:17, 411:21, 411:23, 412:2, 413:24, 424:19, 499:15, 508:17, 510:3, 531:20 permission ^[2] - 352:4, 495:14 PERMIT ^[1] - 328:5 permit ^[16] - 342:3, 369:20, 410:23, 482:25, 525:8, 558:1, 558:5, 558:19, 558:22, 559:20, 560:15, 566:12, 573:4, 573:15, 580:24 permits ^[1] - 552:22 Permits ^[1] - 333:9 permitting ^[4] - 370:25, 406:24, 464:20, 519:13 perpetrating ^[1] - 351:2 person ^[6] - 418:13, 495:19, 495:22, 496:12, 537:22, 558:10 person's ^[2] - 455:10, 471:22 personal ^[2] - 442:9, 570:16 personally ^[2] - 439:8, 560:3 persons ^[3] - 440:11,	442:24, 487:3 perspective ^[10] - 388:12, 417:20, 442:20, 444:16, 486:6, 501:7, 523:9, 531:23, 566:12 pertaining ^[3] - 374:15, 493:1, 520:16 pertinent ^[3] - 378:25, 498:10, 551:18 Ph.D ^[3] - 450:8, 450:24, 485:24 Ph.D.s ^[1] - 486:3 phase ^[2] - 506:18, 507:13 pheasant ^[1] - 504:18 Phenomena ^[1] - 337:19 Philadelphia ^[1] - 432:25 philosophy ^[2] - 485:25, 486:2 phone ^[11] - 410:1, 410:10, 414:3, 495:3, 495:6, 495:15, 496:3, 496:17, 518:2, 530:22, 540:16 phones ^[2] - 370:17, 446:19 Photosensitive ^[2] - 335:23, 335:25 photosensitive ^[1] - 455:1 phrase ^[1] - 442:4 physical ^[1] - 357:19 physically ^[1] - 535:16 physician ^[6] - 432:12, 433:23, 434:17, 434:18, 444:19, 448:7 picture ^[1] - 517:9 piece ^[4] - 424:19, 464:4, 510:23, 519:3 pieces ^[4] - 524:1, 527:20, 553:5, 564:9 Pierre ^[1] - 329:3 pills ^[1] - 443:5 pinpoints ^[1] - 528:10 pipelines ^[1] - 552:23 place ^[16] - 354:15, 372:19, 393:22, 423:12, 445:17, 445:16, 482:6, 520:7, 525:1, 533:10, 537:11, 562:11, 568:4, 570:7, 580:20 Placebo ^[1] - 337:19
---	--	--	---	---

<p>placed [6] - 500:21, 501:9, 525:2, 529:10, 533:3, 539:8</p> <p>placement [5] - 433:18, 500:20, 501:5, 524:19, 539:5</p> <p>places [3] - 388:10, 399:22, 520:1</p> <p>placing [1] - 519:9</p> <p>Plan [1] - 333:10</p> <p>plan [2] - 361:12, 361:13</p> <p>planning [2] - 450:14, 461:14</p> <p>plans [1] - 378:21</p> <p>plant [1] - 542:9</p> <p>Platform [1] - 336:24</p> <p>plausible [1] - 393:8</p> <p>play [3] - 434:3, 520:2, 559:12</p> <p>pleasure [2] - 446:13, 449:22</p> <p>plug [1] - 391:16</p> <p>plus [1] - 428:1</p> <p>pockets [2] - 503:14, 504:5</p> <p>point [34] - 348:17, 350:23, 375:1, 375:4, 375:7, 381:15, 389:23, 392:10, 401:21, 405:15, 405:22, 405:23, 406:4, 406:7, 407:15, 434:3, 434:12, 441:23, 446:18, 459:22, 461:9, 463:22, 468:8, 472:8, 473:17, 477:19, 494:25, 495:2, 512:16, 535:2, 551:15, 553:16, 566:11, 579:2</p> <p>Point [4] - 459:6, 462:2, 462:6, 462:23</p> <p>points [1] - 391:16</p> <p>poison [1] - 445:3</p> <p>policy [2] - 517:4, 520:6</p> <p>Polysomnographic [1] - 335:11</p> <p>population [3] - 489:15, 505:3, 570:3</p> <p>populations [1] - 505:14</p> <p>porch [3] - 442:15, 442:16</p> <p>portion [9] - 478:8, 516:18, 516:23,</p>	<p>517:18, 546:21, 546:22, 547:9, 547:13, 583:21</p> <p>portions [2] - 542:19, 549:14</p> <p>posed [3] - 411:1, 448:22, 485:3</p> <p>poses [1] - 454:18</p> <p>position [17] - 352:14, 352:25, 409:15, 460:10, 482:12, 497:12, 497:13, 498:11, 553:22, 559:9, 559:14, 561:18, 569:12, 569:14, 569:25, 570:18, 570:21</p> <p>positions [1] - 584:11</p> <p>positive [4] - 520:9, 520:11, 525:3, 525:7</p> <p>possess [1] - 374:21</p> <p>possibility [1] - 441:13</p> <p>possible [13] - 360:5, 360:9, 464:23, 483:3, 483:4, 502:1, 502:7, 517:16, 519:9, 524:22, 525:15, 551:7, 558:18</p> <p>Possible [1] - 340:13</p> <p>possibly [3] - 457:11, 467:9, 565:10</p> <p>post [5] - 374:19, 428:25, 429:2, 478:20, 525:7</p> <p>post-signature [1] - 374:19</p> <p>postconstruction [34] - 384:12, 387:8, 387:11, 388:15, 388:24, 389:8, 393:18, 393:25, 406:9, 406:16, 408:13, 410:25, 416:8, 417:17, 418:12, 418:15, 418:25, 419:7, 420:7, 420:14, 427:8, 428:7, 428:16, 429:3, 429:6, 460:7, 468:21, 478:14, 507:12, 508:20, 508:21, 511:8, 532:25, 563:25</p> <p>posthearing [2] - 386:14, 583:8</p> <p>Potential [1] - 336:3</p> <p>potential [32] - 386:6,</p>	<p>386:10, 386:11, 432:17, 434:9, 436:4, 444:10, 448:23, 448:24, 448:25, 500:7, 500:8, 510:9, 510:23, 514:9, 515:8, 515:13, 519:2, 519:16, 520:3, 522:7, 522:20, 523:11, 523:24, 526:4, 531:17, 532:3, 532:6, 532:14, 550:16, 558:1, 560:15</p> <p>potentially [3] - 525:18, 551:11, 554:10</p> <p>Pothole [3] - 501:12, 503:1, 524:13</p> <p>pour [1] - 423:23</p> <p>Power [3] - 333:23, 336:23, 338:24</p> <p>power [6] - 359:4, 411:12, 412:1, 412:6, 416:2, 469:10</p> <p>powerful [1] - 369:17</p> <p>Poweshiek [1] - 333:5</p> <p>PPA [2] - 564:15, 565:7</p> <p>practical [2] - 411:20, 570:4</p> <p>practice [6] - 432:13, 444:19, 449:1, 449:8, 449:14, 572:24</p> <p>practices [9] - 424:14, 462:24, 463:7, 463:12, 463:25, 464:19, 480:22, 482:22, 482:24</p> <p>practicing [1] - 451:6</p> <p>prairie [20] - 503:4, 503:14, 504:19, 504:22, 505:2, 506:15, 507:8, 508:7, 521:18, 527:15, 527:16, 529:10, 530:14, 530:16, 535:8, 535:22, 535:24, 536:2</p> <p>Prairie [6] - 334:3, 501:12, 502:21, 502:25, 524:13</p> <p>Pranav [1] - 340:13</p> <p>pre [3] - 427:7, 428:25, 429:2</p> <p>Precision [1] - 328:24</p>	<p>preclude [1] - 521:24</p> <p>preconstruction [14] - 387:5, 387:9, 387:12, 388:14, 389:3, 406:10, 406:11, 406:14, 416:5, 416:18, 418:23, 429:3, 478:21, 515:3</p> <p>predict [1] - 531:15</p> <p>predicted [2] - 422:22, 429:14</p> <p>predictor [1] - 418:25</p> <p>prefer [4] - 420:17, 496:11, 517:4, 565:25</p> <p>preference [12] - 463:12, 472:10, 472:22, 473:11, 473:14, 474:14, 481:6, 481:14, 481:20, 481:24, 481:25, 482:7</p> <p>preferences [1] - 496:13</p> <p>prefile [1] - 452:7</p> <p>Prefiled [9] - 344:12, 355:19, 355:23, 356:17, 416:9, 433:5, 538:10, 558:23, 569:13</p> <p>prefiled [15] - 356:9, 356:25, 358:24, 416:16, 433:12, 437:22, 451:25, 452:14, 498:16, 541:15, 541:22, 552:25, 553:7, 558:3, 558:7</p> <p>prehearing [1] - 577:5</p> <p>prejudice [1] - 580:17</p> <p>preliminary [2] - 477:11, 510:15</p> <p>premodeling [1] - 418:24</p> <p>prepare [1] - 362:8</p> <p>prepared [5] - 353:5, 355:14, 369:13, 548:17, 574:19</p> <p>prepares [1] - 434:18</p> <p>preparing [1] - 368:20</p> <p>presence [2] - 439:25, 440:12</p> <p>present [3] - 351:5, 374:24, 495:14</p> <p>presentation [19] - 465:7, 465:10, 465:12, 465:16, 465:17, 465:18, 465:23, 466:12,</p>	<p>467:14, 469:16, 469:19, 469:22, 470:1, 470:2, 470:12, 470:25, 472:3, 472:9, 473:12</p> <p>Presentation [1] - 340:21</p> <p>presentations [3] - 374:4, 374:6</p> <p>presented [4] - 370:19, 374:11, 557:11, 573:22</p> <p>presenter [1] - 465:16</p> <p>presenting [1] - 402:4</p> <p>president [1] - 465:13</p> <p>press [1] - 439:11</p> <p>Pressure [1] - 338:13</p> <p>pressure [12] - 366:21, 367:2, 436:10, 441:20, 442:21, 442:24, 443:5, 443:8, 443:9, 443:12, 443:21, 453:11</p> <p>pressure's [1] - 442:22</p> <p>presumably [1] - 413:22</p> <p>presumption [1] - 405:21</p> <p>pretty [10] - 418:24, 419:19, 425:19, 438:19, 444:22, 444:25, 523:22, 555:22, 558:14, 562:9</p> <p>prevent [2] - 425:24, 508:23</p> <p>preventing [1] - 489:3</p> <p>prevents [1] - 561:7</p> <p>previous [3] - 393:22, 563:6, 583:14</p> <p>previously [10] - 345:2, 356:24, 387:21, 472:13, 516:24, 541:20, 553:3, 556:11, 556:16, 576:12</p> <p>pride [1] - 478:16</p> <p>primarily [5] - 415:23, 448:10, 503:13, 514:18, 522:6</p> <p>primary [4] - 504:18, 505:4, 518:25, 535:9</p> <p>Primary [1] - 337:9</p> <p>principal [2] - 349:23, 350:14</p> <p>printing [1] - 576:20</p> <p>private [2] - 497:22, 509:9</p>
---	---	---	---	---

<p>probabilities [3] - 359:8, 360:20, 398:23</p> <p>probability [2] - 399:2, 399:7</p> <p>problem [1] - 414:5</p> <p>problematic [2] - 416:25, 489:7</p> <p>procedure [1] - 413:18</p> <p>Procedures [1] - 337:21</p> <p>proceed [5] - 355:10, 365:6, 496:25, 513:19, 575:11</p> <p>Proceeding [1] - 328:7</p> <p>proceeding [12] - 349:21, 373:14, 373:15, 461:2, 462:2, 464:20, 474:23, 478:22, 479:20, 479:22, 552:20, 568:2</p> <p>proceedings [4] - 329:1, 459:6, 585:9, 585:12</p> <p>process [25] - 370:25, 374:14, 520:10, 537:6, 550:15, 559:10, 560:2, 560:22, 561:9, 561:12, 561:17, 561:21, 561:24, 561:25, 562:1, 562:3, 562:4, 562:7, 566:4, 566:10, 568:9, 568:12, 569:21, 584:2, 584:13</p> <p>processes [1] - 385:5</p> <p>processing [1] - 556:8</p> <p>procuring [1] - 565:6</p> <p>produce [2] - 378:18, 378:23</p> <p>Produced [1] - 335:13</p> <p>produced [4] - 378:24, 379:3, 379:21, 395:3</p> <p>produces [1] - 385:22</p> <p>producing [1] - 469:10</p> <p>product [7] - 370:11, 370:19, 385:23, 393:15, 393:16, 516:17, 564:10</p> <p>production [2] - 393:19, 500:21</p> <p>productive [1] - 503:6</p> <p>profession [1] - 406:22</p> <p>professional [21] -</p>	<p>344:25, 345:13, 346:7, 346:15, 346:23, 347:3, 347:5, 347:10, 347:14, 347:22, 348:8, 348:10, 348:16, 349:4, 350:1, 350:7, 351:20, 352:22, 373:3, 375:6, 433:23</p> <p>Professional [2] - 585:6, 585:19</p> <p>professor [2] - 451:2, 485:18</p> <p>professorship [1] - 485:19</p> <p>program [8] - 343:21, 343:22, 419:8, 425:11, 427:24, 428:16, 471:2, 472:1</p> <p>programs [4] - 416:6, 417:21, 425:2, 429:6</p> <p>prohibits [2] - 560:8, 560:14</p> <p>project [101] - 367:4, 369:13, 379:9, 380:16, 380:17, 381:15, 393:16, 404:24, 412:1, 412:6, 412:10, 412:14, 412:17, 417:3, 421:10, 422:22, 427:13, 432:18, 433:16, 450:18, 452:18, 454:1, 457:16, 461:7, 461:8, 463:17, 463:23, 464:8, 464:14, 466:3, 472:8, 473:21, 479:1, 479:8, 479:21, 481:24, 499:14, 499:23, 500:6, 500:10, 500:11, 501:3, 501:5, 501:12, 501:17, 502:5, 502:15, 505:17, 507:13, 508:23, 508:24, 511:15, 513:21, 513:23, 514:2, 515:22, 516:18, 516:23, 517:8, 517:14, 518:22, 520:12, 521:10, 522:25, 524:7, 524:25, 526:19, 528:15, 532:10, 537:11, 539:17,</p>	<p>542:20, 544:20, 546:8, 546:20, 546:21, 547:9, 547:10, 547:13, 547:14, 547:15, 547:16, 548:1, 548:3, 549:14, 549:16, 551:13, 553:20, 555:3, 561:11, 561:23, 564:2, 564:16, 564:20, 564:24, 571:11, 573:3, 573:6, 578:1</p> <p>Project [8] - 336:17, 336:17, 343:6, 373:20, 415:9, 499:13, 516:24, 517:13</p> <p>projects [49] - 361:20, 373:22, 393:2, 393:18, 415:21, 415:22, 415:23, 416:1, 418:20, 418:21, 418:22, 419:3, 451:9, 451:15, 451:17, 453:22, 460:21, 477:2, 479:5, 481:21, 492:14, 498:12, 501:25, 504:21, 505:24, 506:14, 507:7, 507:11, 507:17, 507:19, 508:9, 508:10, 510:22, 511:3, 511:13, 511:14, 513:2, 519:14, 520:2, 521:1, 521:2, 523:14, 527:20, 527:24, 528:8, 528:12, 553:13, 555:20, 570:9</p> <p>Projects [3] - 333:23, 334:4, 338:9</p> <p>prominently [1] - 503:16</p> <p>promulgated [1] - 438:13</p> <p>proper [8] - 343:25, 350:24, 420:14, 450:17, 451:16, 452:20, 452:22, 566:10</p> <p>properly [2] - 457:16, 582:22</p> <p>properties [6] - 391:4, 391:6, 391:8, 516:16, 543:12,</p>	<p>543:16</p> <p>Property [3] - 333:9, 337:14, 337:15</p> <p>property [14] - 358:10, 376:10, 377:1, 379:14, 379:16, 391:2, 391:19, 392:3, 392:8, 392:22, 393:6, 405:22, 442:13</p> <p>proposal [6] - 376:8, 376:14, 409:12, 409:13, 530:25, 582:9</p> <p>propose [1] - 557:8</p> <p>proposed [36] - 350:13, 363:23, 380:3, 381:19, 405:18, 408:21, 408:24, 410:23, 415:11, 417:6, 417:18, 417:22, 417:24, 433:16, 452:19, 455:12, 500:11, 508:11, 516:18, 516:23, 517:8, 534:8, 536:22, 547:9, 555:21, 556:18, 557:3, 558:5, 559:1, 559:14, 567:19, 569:10, 570:5, 571:5, 573:14, 580:24</p> <p>Proposed [4] - 338:8, 339:10, 340:7, 340:12</p> <p>protect [9] - 422:18, 443:17, 455:18, 455:21, 462:4, 462:18, 468:11, 554:12, 554:22</p> <p>protected [3] - 565:13, 565:15, 565:21</p> <p>protecting [1] - 490:20</p> <p>protection [3] - 455:22, 467:13, 554:20</p> <p>protective [3] - 454:5, 486:8, 492:22</p> <p>protocol [1] - 405:12</p> <p>provide [28] - 343:8, 356:3, 356:25, 358:24, 374:17, 415:14, 416:16, 432:19, 433:12, 450:19, 452:14, 474:21, 501:25, 505:19, 506:4,</p>	<p>506:14, 519:15, 521:7, 525:14, 525:23, 538:15, 550:22, 558:21, 566:10, 569:14, 573:4, 577:14, 584:5</p> <p>provided [23] - 343:7, 363:15, 364:25, 365:2, 365:20, 368:11, 370:2, 378:16, 450:17, 454:3, 456:8, 458:21, 459:6, 470:5, 487:9, 526:3, 537:14, 538:14, 547:23, 551:8, 551:18, 575:2, 576:12</p> <p>provider [1] - 371:9</p> <p>provides [1] - 547:10</p> <p>providing [5] - 351:12, 351:16, 351:24, 369:18, 520:9</p> <p>proviso [1] - 413:19</p> <p>proximity [5] - 500:12, 513:4, 521:5, 522:5, 523:6</p> <p>prudent [1] - 557:10</p> <p>PSC [1] - 339:5</p> <p>psychiatry [1] - 448:16</p> <p>Psychogenic [2] - 337:13, 338:4</p> <p>Psychological [1] - 335:10</p> <p>Public [11] - 336:16, 339:3, 339:7, 340:10, 398:17, 451:14, 451:20, 552:16, 568:17, 585:7, 585:18</p> <p>PUBLIC [2] - 328:1, 328:11</p> <p>public [15] - 346:5, 350:20, 370:3, 371:15, 433:3, 461:4, 461:6, 497:4, 497:22, 500:25, 505:25, 563:10, 563:18, 566:21, 570:2</p> <p>publications [4] - 439:11, 451:12, 459:23, 474:24</p> <p>publicly [1] - 563:18</p> <p>published [9] - 437:6, 451:11, 452:18, 456:4, 456:15, 463:4, 463:6, 474:10, 478:17</p>
---	---	---	--	---

<p>PUC ^[15] - 332:2, 333:14, 334:7, 334:10, 336:6, 336:8, 336:10, 336:12, 336:16, 336:22, 339:14, 340:2, 523:2, 580:4, 580:21</p> <p>pull ^[1] - 538:19</p> <p>pulling ^[1] - 571:6</p> <p>purchase ^[1] - 565:3</p> <p>purchased ^[1] - 516:16</p> <p>purpose ^[3] - 385:14, 405:13, 517:7</p> <p>purposes ^[5] - 406:24, 434:16, 434:20, 546:7, 559:19</p> <p>pursuant ^[1] - 555:7</p> <p>pursue ^[3] - 349:8, 525:9, 568:18</p> <p>pursuing ^[1] - 348:18</p> <p>pursuits ^[1] - 569:21</p> <p>pushback ^[1] - 474:1</p> <p>put ^[27] - 353:23, 357:9, 360:25, 366:15, 373:8, 373:10, 373:17, 382:4, 391:15, 399:14, 420:5, 446:19, 455:16, 467:5, 469:17, 471:7, 471:8, 477:16, 481:18, 486:21, 489:25, 520:7, 524:23, 529:20, 554:20, 564:9, 566:17</p> <p>putting ^[2] - 501:15, 546:15</p> <p>puzzle ^[1] - 510:24</p> <p>puzzles ^[1] - 391:5</p>	<p>questionnaire ^[1] - 441:17</p> <p>Questions ^[13] - 330:5, 330:10, 330:15, 330:20, 331:5, 331:9, 331:13, 331:17, 331:20, 331:24, 332:5, 332:9, 332:13</p> <p>questions ^[102] - 344:20, 348:15, 353:8, 366:5, 366:10, 372:22, 374:2, 374:3, 375:1, 375:12, 385:2, 386:18, 389:11, 390:4, 393:14, 394:5, 394:23, 394:24, 395:6, 395:7, 397:20, 397:25, 401:20, 401:22, 403:12, 404:12, 407:3, 407:6, 408:4, 408:14, 408:22, 410:16, 414:2, 414:7, 414:9, 414:12, 414:14, 418:2, 418:6, 421:24, 424:8, 427:4, 431:4, 431:22, 435:23, 438:21, 438:24, 439:19, 447:6, 447:7, 447:8, 449:17, 476:23, 483:7, 483:9, 483:12, 483:14, 485:9, 485:16, 492:24, 493:15, 493:19, 493:21, 495:11, 512:5, 513:9, 513:18, 518:7, 518:9, 520:25, 523:16, 526:13, 539:23, 540:1, 540:7, 541:22, 543:25, 544:10, 546:16, 548:12, 548:14, 548:17, 550:2, 550:3, 551:2, 551:24, 557:13, 557:17, 562:11, 562:15, 562:17, 562:18, 568:6, 568:8, 568:15, 570:19, 570:22, 571:21, 572:13, 574:1, 575:23</p> <p>quick ^[2] - 402:19,</p>	<p>548:20</p> <p>quickly ^[8] - 342:10, 354:13, 374:9, 374:10, 385:3, 411:4, 583:22, 584:6</p> <p>quiet ^[2] - 535:23, 536:8</p> <p>quite ^[10] - 348:23, 386:3, 419:1, 421:9, 454:21, 454:23, 455:6, 522:11, 522:12, 527:23</p> <p>quote ^[2] - 347:1, 486:21</p> <p>quoted ^[1] - 475:22</p>	<p>561:1, 577:13</p> <p>readily ^[1] - 351:19</p> <p>reading ^[6] - 367:23, 406:12, 440:20, 480:12, 561:4</p> <p>readings ^[1] - 389:7</p> <p>reads ^[2] - 517:25, 561:6</p> <p>ready ^[1] - 581:18</p> <p>real ^[4] - 407:16, 527:3, 543:19, 558:11</p> <p>Realistic ^[2] - 338:15, 338:17</p> <p>realistic ^[3] - 360:13, 360:23, 399:9</p> <p>reality ^[1] - 400:7</p> <p>realize ^[1] - 430:19</p> <p>realized ^[1] - 411:10</p> <p>realizing ^[1] - 353:19</p> <p>really ^[28] - 348:4, 348:23, 370:24, 372:6, 372:19, 378:11, 383:23, 388:12, 394:11, 413:3, 420:4, 422:17, 444:18, 445:7, 447:22, 447:24, 455:14, 473:3, 479:19, 512:6, 522:14, 527:11, 533:7, 549:4, 562:20, 563:16, 570:22, 584:4</p> <p>realm ^[1] - 406:20</p> <p>Realtime ^[2] - 585:6, 585:19</p> <p>reason ^[12] - 360:2, 383:15, 387:4, 388:13, 391:13, 403:7, 429:18, 462:8, 488:22, 522:2, 533:9, 535:9</p> <p>reasonable ^[12] - 350:23, 420:19, 420:23, 455:17, 462:4, 462:16, 462:17, 467:13, 490:19, 528:14, 535:25, 557:10</p> <p>reasons ^[4] - 372:2, 417:1, 488:21, 571:14</p> <p>reassured ^[1] - 444:21</p> <p>Rebuttal ^[14] - 336:23, 337:4, 337:13, 337:16, 338:6, 338:11, 338:12, 338:17, 356:17,</p>	<p>416:9, 422:25, 433:5, 452:7, 553:14</p> <p>rebuttal ^[3] - 574:20, 574:21</p> <p>receive ^[3] - 573:9, 575:23, 583:16</p> <p>received ^[8] - 394:2, 395:8, 408:20, 408:21, 526:23, 542:2, 545:4, 573:10</p> <p>receives ^[1] - 525:8</p> <p>receiving ^[1] - 542:1</p> <p>recent ^[16] - 362:9, 418:22, 419:18, 428:12, 428:22, 430:20, 437:6, 438:12, 499:20, 514:2, 526:16, 554:18, 559:23, 567:4, 576:12</p> <p>recently ^[2] - 526:24, 556:4</p> <p>Receptor ^[2] - 335:3, 338:17</p> <p>receptor ^[18] - 357:9, 359:10, 361:8, 361:10, 361:12, 362:24, 376:4, 380:20, 381:1, 386:21, 395:14, 397:13, 397:14, 401:1, 426:13, 426:22, 427:2, 474:12</p> <p>Receptors ^[1] - 340:17</p> <p>receptors ^[28] - 357:17, 358:19, 359:14, 361:4, 361:6, 362:3, 364:22, 383:15, 383:16, 384:7, 384:8, 386:12, 386:22, 388:17, 395:1, 399:20, 403:4, 403:10, 442:14, 460:22, 463:14, 464:22, 481:8, 481:15, 481:22, 483:2</p> <p>recess ^[8] - 342:15, 352:11, 392:18, 410:10, 410:12, 494:4, 540:20, 572:3</p> <p>recipient ^[1] - 369:2</p> <p>reciprocity ^[2] - 345:5, 345:9</p> <p>recite ^[1] - 363:11</p> <p>recognize ^[2] - 442:7, 489:17</p> <p>recognized ^[3] -</p>
<p>Q</p>		<p>R</p>		
<p>Qualifications ^[1] - 337:14</p> <p>quality ^[9] - 451:6, 455:18, 455:19, 455:22, 455:25, 456:4, 456:9, 457:18, 486:23</p> <p>Quality ^[1] - 337:7</p> <p>quantified ^[1] - 412:8</p> <p>quarter ^[1] - 527:21</p> <p>queen ^[1] - 381:6</p> <p>Queens ^[1] - 450:23</p> <p>questioning ^[4] - 349:12, 375:7, 482:11, 482:14</p>	<p>questionnaire ^[1] - 441:17</p> <p>Questions ^[13] - 330:5, 330:10, 330:15, 330:20, 331:5, 331:9, 331:13, 331:17, 331:20, 331:24, 332:5, 332:9, 332:13</p> <p>questions ^[102] - 344:20, 348:15, 353:8, 366:5, 366:10, 372:22, 374:2, 374:3, 375:1, 375:12, 385:2, 386:18, 389:11, 390:4, 393:14, 394:5, 394:23, 394:24, 395:6, 395:7, 397:20, 397:25, 401:20, 401:22, 403:12, 404:12, 407:3, 407:6, 408:4, 408:14, 408:22, 410:16, 414:2, 414:7, 414:9, 414:12, 414:14, 418:2, 418:6, 421:24, 424:8, 427:4, 431:4, 431:22, 435:23, 438:21, 438:24, 439:19, 447:6, 447:7, 447:8, 449:17, 476:23, 483:7, 483:9, 483:12, 483:14, 485:9, 485:16, 492:24, 493:15, 493:19, 493:21, 495:11, 512:5, 513:9, 513:18, 518:7, 518:9, 520:25, 523:16, 526:13, 539:23, 540:1, 540:7, 541:22, 543:25, 544:10, 546:16, 548:12, 548:14, 548:17, 550:2, 550:3, 551:2, 551:24, 557:13, 557:17, 562:11, 562:15, 562:17, 562:18, 568:6, 568:8, 568:15, 570:19, 570:22, 571:21, 572:13, 574:1, 575:23</p> <p>quick ^[2] - 402:19,</p>	<p>r04 ^[1] - 337:3</p> <p>railroads ^[1] - 438:5</p> <p>raise ^[3] - 414:9, 431:23, 496:22</p> <p>raised ^[1] - 410:16</p> <p>ramped ^[2] - 344:8, 353:15</p> <p>ran ^[2] - 372:9, 403:3</p> <p>range ^[11] - 447:16, 457:2, 457:7, 457:9, 458:5, 460:14, 460:22, 481:12, 481:21, 481:25, 528:8</p> <p>Range ^[10] - 361:22, 361:23, 379:25, 380:8, 380:22, 391:14, 391:19, 391:22, 393:2, 393:4</p> <p>ranges ^[1] - 528:4</p> <p>Raptor ^[1] - 333:6</p> <p>rate ^[3] - 454:24, 454:25, 457:1</p> <p>rather ^[5] - 389:7, 405:6, 405:21, 430:17, 460:2</p> <p>reach ^[5] - 559:24, 560:3, 568:2, 568:7, 568:11</p> <p>reached ^[4] - 440:22, 459:16, 560:4, 560:19</p> <p>reaching ^[3] - 561:7, 566:5, 573:23</p> <p>read ^[17] - 352:7, 354:14, 383:1, 384:24, 422:14, 422:21, 442:5, 460:17, 466:11, 472:17, 481:18, 487:11, 517:24, 537:20, 538:3,</p>	<p>561:1, 577:13</p> <p>readily ^[1] - 351:19</p> <p>reading ^[6] - 367:23, 406:12, 440:20, 480:12, 561:4</p> <p>readings ^[1] - 389:7</p> <p>reads ^[2] - 517:25, 561:6</p> <p>ready ^[1] - 581:18</p> <p>real ^[4] - 407:16, 527:3, 543:19, 558:11</p> <p>Realistic ^[2] - 338:15, 338:17</p> <p>realistic ^[3] - 360:13, 360:23, 399:9</p> <p>reality ^[1] - 400:7</p> <p>realize ^[1] - 430:19</p> <p>realized ^[1] - 411:10</p> <p>realizing ^[1] - 353:19</p> <p>really ^[28] - 348:4, 348:23, 370:24, 372:6, 372:19, 378:11, 383:23, 388:12, 394:11, 413:3, 420:4, 422:17, 444:18, 445:7, 447:22, 447:24, 455:14, 473:3, 479:19, 512:6, 522:14, 527:11, 533:7, 549:4, 562:20, 563:16, 570:22, 584:4</p> <p>realm ^[1] - 406:20</p> <p>Realtime ^[2] - 585:6, 585:19</p> <p>reason ^[12] - 360:2, 383:15, 387:4, 388:13, 391:13, 403:7, 429:18, 462:8, 488:22, 522:2, 533:9, 535:9</p> <p>reasonable ^[12] - 350:23, 420:19, 420:23, 455:17, 462:4, 462:16, 462:17, 467:13, 490:19, 528:14, 535:25, 557:10</p> <p>reasons ^[4] - 372:2, 417:1, 488:21, 571:14</p> <p>reassured ^[1] - 444:21</p> <p>Rebuttal ^[14] - 336:23, 337:4, 337:13, 337:16, 338:6, 338:11, 338:12, 338:17, 356:17,</p>	<p>416:9, 422:25, 433:5, 452:7, 553:14</p> <p>rebuttal ^[3] - 574:20, 574:21</p> <p>receive ^[3] - 573:9, 575:23, 583:16</p> <p>received ^[8] - 394:2, 395:8, 408:20, 408:21, 526:23, 542:2, 545:4, 573:10</p> <p>receives ^[1] - 525:8</p> <p>receiving ^[1] - 542:1</p> <p>recent ^[16] - 362:9, 418:22, 419:18, 428:12, 428:22, 430:20, 437:6, 438:12, 499:20, 514:2, 526:16, 554:18, 559:23, 567:4, 576:12</p> <p>recently ^[2] - 526:24, 556:4</p> <p>Receptor ^[2] - 335:3, 338:17</p> <p>receptor ^[18] - 357:9, 359:10, 361:8, 361:10, 361:12, 362:24, 376:4, 380:20, 381:1, 386:21, 395:14, 397:13, 397:14, 401:1, 426:13, 426:22, 427:2, 474:12</p> <p>Receptors ^[1] - 340:17</p> <p>receptors ^[28] - 357:17, 358:19, 359:14, 361:4, 361:6, 362:3, 364:22, 383:15, 383:16, 384:7, 384:8, 386:12, 386:22, 388:17, 395:1, 399:20, 403:4, 403:10, 442:14, 460:22, 463:14, 464:22, 481:8, 481:15, 481:22, 483:2</p> <p>recess ^[8] - 342:15, 352:11, 392:18, 410:10, 410:12, 494:4, 540:20, 572:3</p> <p>recipient ^[1] - 369:2</p> <p>reciprocity ^[2] - 345:5, 345:9</p> <p>recite ^[1] - 363:11</p> <p>recognize ^[2] - 442:7, 489:17</p> <p>recognized ^[3] -</p>

465:24, 466:4, 466:9 recollection [2] - 402:7, 576:2 recommend [10] - 417:23, 472:10, 478:22, 479:22, 481:14, 482:25, 505:15, 506:10, 524:22, 528:7 Recommendation [1] - 337:3 recommendation [23] - 417:12, 464:19, 472:21, 475:19, 475:23, 480:22, 481:13, 482:22, 482:24, 501:4, 501:24, 506:16, 512:11, 512:14, 520:6, 521:17, 522:3, 522:6, 539:11, 555:1, 562:24, 563:21, 569:15 recommendations [26] - 370:1, 472:2, 472:5, 472:7, 479:20, 481:2, 482:9, 506:14, 508:8, 510:17, 517:8, 519:8, 519:15, 519:18, 519:22, 519:24, 520:2, 520:15, 520:18, 521:7, 525:14, 525:24, 528:12, 528:19, 528:20, 532:12 recommendations/ suggestions [1] - 521:12 recommended [7] - 461:18, 470:3, 508:13, 559:1, 562:21, 573:4, 573:15 Recommended [1] - 340:16 recommending [1] - 559:19 reconsider [2] - 559:11, 559:14 reconvene [1] - 494:3 record [36] - 342:25, 344:14, 344:20, 348:24, 351:6, 363:14, 377:19, 377:21, 377:25, 381:25, 382:25, 395:17, 415:4,	432:11, 439:2, 439:3, 450:6, 451:19, 474:8, 483:17, 497:4, 538:6, 541:4, 541:20, 546:14, 546:15, 552:13, 553:2, 556:12, 556:17, 562:10, 570:10, 572:4, 576:1, 576:3, 576:4 recorded [3] - 412:11, 426:12, 543:12 recording [1] - 532:17 records [3] - 397:7, 548:4, 551:16 Recross [10] - 330:11, 330:12, 330:16, 330:21, 330:21, 331:6, 331:14, 331:17, 331:21, 332:10 recross [5] - 404:11, 431:3, 539:25, 551:3, 574:3 RECROSS [4] - 404:14, 431:8, 447:12, 551:5 Recross- Examination [10] - 330:11, 330:12, 330:16, 330:21, 330:21, 331:6, 331:14, 331:17, 331:21, 332:10 RECROSS- EXAMINATION [4] - 404:14, 431:8, 447:12, 551:5 red [3] - 382:2, 382:4, 526:4 Redirect [8] - 330:6, 330:11, 330:16, 330:20, 331:13, 332:6, 332:9, 332:13 redirect [23] - 401:24, 404:12, 407:23, 430:24, 430:25, 431:24, 447:3, 447:4, 449:18, 483:16, 493:16, 493:17, 538:7, 538:23, 539:23, 540:1, 540:9, 550:12, 552:1, 568:16, 571:23, 572:7, 574:9 REDIRECT [4] - 402:1, 538:8, 550:13, 572:8 reduce [7] - 360:22,	399:8, 400:18, 403:9, 405:13, 457:18, 457:23 reduced [4] - 365:18, 403:11, 514:4 reducing [1] - 405:25 reduction [5] - 383:13, 384:4, 384:9, 391:3, 405:15 reductions [2] - 405:16, 427:22 refer [13] - 399:15, 458:20, 465:3, 465:5, 466:22, 475:9, 476:7, 478:2, 480:3, 480:13, 484:11, 486:20, 546:19 reference [7] - 349:22, 405:22, 417:10, 467:22, 492:24, 530:1, 538:14 referenced [3] - 409:19, 425:1, 469:17 references [2] - 409:18, 518:25 referencing [1] - 469:19 referred [12] - 349:21, 363:9, 367:20, 402:5, 402:16, 406:10, 475:24, 514:24, 516:13, 516:22, 516:24, 518:14 referring [11] - 367:1, 368:7, 374:12, 385:12, 402:17, 457:21, 470:9, 478:25, 479:1, 486:16, 561:24 refers [3] - 476:1, 479:14, 545:19 reflect [2] - 377:20, 377:25 Reflect [2] - 334:24, 335:4 reflects [1] - 562:10 refreshing [1] - 516:8 regard [16] - 345:11, 357:1, 358:25, 361:10, 361:12, 362:14, 362:23, 366:10, 378:7, 406:8, 415:8, 500:5, 508:12, 515:22, 577:18, 578:16 regarding [15] - 333:21, 333:22,	336:9, 336:10, 339:17, 347:9, 369:3, 374:4, 375:1, 389:11, 415:12, 507:4, 555:21, 558:18, 570:25 regardless [5] - 412:24, 470:14, 471:5, 471:14, 471:20 regards [2] - 451:23, 523:19 region [3] - 504:7, 543:11, 553:13 Region [5] - 333:23, 334:3, 501:13, 503:1, 524:13 Region's [1] - 334:3 regions [1] - 501:14 register [1] - 360:7 Registered [2] - 585:5, 585:19 registered [5] - 344:4, 346:12, 346:15, 346:23, 348:7 registration [2] - 344:6, 345:24 regression [2] - 436:12, 436:20 regular [2] - 412:25, 506:13 regulated [4] - 470:14, 471:5, 471:15, 471:20 regulating [1] - 424:10 Regulation [1] - 339:8 regulatory [3] - 472:15, 519:13, 520:7 relate [1] - 552:20 related [7] - 382:18, 432:18, 449:3, 471:3, 503:7, 504:22, 527:12 relates [3] - 410:21, 552:23, 553:12 relation [1] - 582:18 relayed [1] - 571:14 Release [1] - 340:22 released [1] - 438:13 releases [1] - 369:2 relevance [1] - 370:25 relevant [10] - 349:3, 377:4, 473:3, 498:10, 514:25, 519:3, 526:13, 528:3, 560:23, 580:16 reliability [2] - 370:5, 393:16	reliable [1] - 389:2 33 reliance [1] - 459:22 relies [1] - 411:8 relocated [1] - 364:21 relocating [2] - 364:4, 365:15 relocation [1] - 377:21 rely [7] - 369:25, 370:2, 370:3, 370:4, 371:17, 371:18 remain [3] - 369:8, 371:7, 504:6 remember [18] - 348:9, 383:15, 398:6, 399:13, 400:20, 430:10, 430:12, 431:15, 438:14, 514:20, 528:24, 530:2, 530:6, 530:12, 534:14, 536:23, 564:22, 582:6 remind [2] - 410:15, 575:7 remnant [2] - 393:10, 503:14 remove [1] - 519:16 removed [6] - 338:16, 365:19, 457:24, 553:16, 576:16, 582:8 renew [3] - 344:6, 351:20, 353:19 renewal [1] - 353:15 renewed [1] - 347:19 renovating [1] - 449:5 repeat [3] - 517:20, 547:1, 578:10 repeating [1] - 518:1 replace [1] - 512:11 Replacement [1] - 339:10 reply [1] - 371:2 report [33] - 345:12, 349:21, 366:22, 366:24, 368:11, 372:24, 385:21, 406:12, 406:13, 434:4, 434:8, 434:11, 434:19, 436:22, 437:5, 437:9, 440:10, 441:11, 467:14, 488:17, 515:16, 516:5, 517:15, 530:2, 542:2, 542:4, 542:6, 543:20, 544:20, 544:22, 544:25, 546:7 Report [8] - 333:5,
--	--	--	--	--

333:6, 333:6, 333:7, 333:7, 333:8, 333:8, 338:7 reported [7] - 446:9, 477:4, 486:10, 487:23, 487:25, 488:5, 490:7 Reported [5] - 328:24, 335:8, 335:9, 335:17, 337:5 reporter [9] - 342:21, 414:24, 432:7, 450:2, 517:23, 540:24, 552:10, 561:4, 585:9 Reporter [6] - 517:25, 561:6, 585:6, 585:19, 585:19 Reporting [1] - 328:24 reporting [4] - 440:8, 441:1, 488:14, 488:16 reports [18] - 347:17, 349:5, 350:14, 350:15, 351:12, 351:24, 355:13, 355:16, 372:20, 422:21, 434:1, 456:9, 526:3, 526:16, 526:21, 526:23, 543:9, 545:7 represent [5] - 354:20, 379:21, 383:22, 557:23, 570:1 representation [3] - 350:2, 350:3, 350:11 represented [6] - 349:19, 350:1, 372:21, 372:25, 373:23, 375:5 representing [2] - 513:16, 570:2 represents [2] - 390:24, 464:15 reproduced [1] - 463:2 reproductive [1] - 505:5 request [7] - 512:14, 538:24, 555:7, 572:21, 573:2, 573:15, 573:17 Request [3] - 380:12, 381:11, 572:24 requesting [1] - 572:17 Requests [7] - 340:5, 340:6, 381:14, 556:9, 574:22, 575:13, 575:14	requests [3] - 520:15, 570:15, 575:14 require [4] - 388:4, 508:24, 509:18, 554:5 required [9] - 346:17, 349:5, 350:6, 385:21, 387:7, 416:22, 420:22, 460:8, 583:17 requirement [14] - 357:24, 387:6, 387:10, 406:1, 472:25, 509:23, 531:20, 554:3, 554:4, 566:25, 567:2, 570:17, 571:2, 571:16 requirements [12] - 344:7, 353:15, 358:16, 358:17, 365:17, 401:13, 457:15, 463:20, 472:15, 553:18, 553:23, 566:2 requires [2] - 350:8, 350:9 reroutes [1] - 550:21 research [30] - 343:12, 343:13, 374:9, 434:6, 434:16, 436:6, 436:12, 436:18, 437:3, 438:18, 442:19, 451:11, 454:11, 454:12, 456:3, 467:1, 476:25, 477:12, 477:19, 478:12, 479:14, 479:17, 482:2, 489:24, 491:23, 497:22, 507:7, 507:10, 513:2, 514:2 Research [1] - 340:14 researchers [1] - 456:15 researching [1] - 385:7 reserve [1] - 401:21 reserved [1] - 494:14 residence [2] - 397:1, 425:25 residences [1] - 434:25 Residential [1] - 340:17 residents [3] - 439:15, 446:22, 565:13 resource [2] - 343:17, 545:7	Resources [1] - 336:21 resources [2] - 385:14, 541:13 respect [12] - 361:25, 365:14, 365:20, 368:12, 368:21, 417:6, 417:25, 431:20, 438:20, 444:13, 454:6, 454:19 respectfully [1] - 517:23 respond [2] - 348:20, 569:13 response [8] - 346:14, 351:9, 411:2, 482:19, 529:15, 573:9, 573:10, 573:17 Response [2] - 336:25, 338:5 responses [2] - 391:12, 534:1 Responses [17] - 333:14, 334:7, 334:10, 334:11, 334:18, 335:17, 336:6, 336:8, 336:10, 336:12, 336:14, 336:15, 336:22, 338:19, 338:22, 340:3, 340:6 responsibilities [4] - 369:7, 371:6, 497:16, 498:4 responsibility [1] - 369:18 restate [1] - 373:23 restrict [1] - 476:4 restricted [1] - 401:9 restrictive [2] - 358:23, 362:21 rests [1] - 574:13 result [11] - 362:9, 365:23, 366:1, 370:20, 403:8, 427:21, 456:23, 457:6, 475:17, 518:21, 532:15 resulted [1] - 457:25 Results [7] - 335:3, 338:14, 338:15, 338:16, 339:11, 339:18, 339:18 results [20] - 357:19, 358:18, 359:20, 361:6, 362:6, 362:17, 362:23, 364:4, 375:25,	378:16, 383:21, 390:6, 390:12, 391:10, 399:3, 433:22, 446:7, 458:4, 516:5, 577:24 resume [3] - 474:23, 474:25, 499:2 Resume [1] - 340:24 retention [1] - 505:13 retiring [2] - 344:8, 353:17 retracted [1] - 473:15 retracting [1] - 473:23 Retrofitting [1] - 334:6 Rev [1] - 339:11 Rev5 [2] - 339:18, 339:18 Revenues [1] - 336:9 Review [2] - 335:7, 335:15 review [25] - 415:10, 425:6, 425:8, 432:16, 433:14, 450:16, 475:6, 498:5, 498:6, 498:8, 498:10, 498:14, 500:6, 500:17, 515:11, 515:23, 517:10, 518:19, 521:10, 528:12, 529:17, 541:10, 547:23, 558:6, 568:9 reviewed [13] - 422:12, 425:7, 433:25, 444:22, 451:11, 452:17, 459:23, 474:24, 498:19, 515:20, 542:3, 543:9, 545:6 reviewing [6] - 422:5, 498:12, 500:3, 515:16, 537:23, 570:3 reviews [2] - 425:21, 552:21 Revised [13] - 334:5, 336:16, 336:17, 336:17, 336:18, 336:18, 336:19, 336:19, 336:20, 336:20, 336:21, 336:21, 336:22 revoked [1] - 353:10 rich [1] - 384:15 RICH [1] - 331:15 Rich [2] - 388:24, 414:23 Richard [2] - 338:6, 415:5 Ridge [79] - 328:19,	333:3, 335:3, 336:9, 34 338:12, 338:13, 338:14, 338:15, 338:16, 338:19, 338:22, 339:14, 339:17, 342:4, 342:16, 343:5, 361:22, 367:2, 370:10, 372:9, 373:19, 377:9, 380:3, 380:9, 380:25, 403:3, 405:23, 408:8, 409:21, 414:9, 414:21, 415:8, 416:20, 420:24, 430:24, 432:15, 433:17, 449:24, 450:11, 450:12, 452:19, 453:25, 460:25, 461:9, 461:10, 479:24, 494:6, 495:23, 499:13, 499:25, 500:15, 506:19, 511:22, 512:4, 516:16, 516:17, 516:24, 517:13, 537:21, 539:8, 539:18, 539:19, 540:1, 540:2, 543:24, 551:7, 553:14, 555:8, 557:16, 563:5, 563:11, 563:23, 564:19, 564:20, 566:7, 574:3, 574:19, 580:4 ridge [4] - 455:12, 457:14, 502:19, 548:1 RIDGE [1] - 328:4 Ridge's [1] - 538:1 ridges [1] - 535:8 right-hand [4] - 367:9, 368:7, 478:6, 481:1 rigor [1] - 515:4 rigorous [1] - 517:17 rigorousness [1] - 517:3 Risk [1] - 337:18 risk [5] - 369:23, 371:21, 445:8, 445:9, 451:7 Risk-Factor [1] - 337:18 risks [1] - 433:24 Rislov [1] - 328:15 Road [2] - 338:5, 338:6
--	--	---	--	---

roads ^[1] - 542:7 roadway ^[1] - 489:12 Robert ^[2] - 337:16, 432:12 ROBERT ^[1] - 331:18 Robish ^[2] - 391:6, 392:6 Robish's ^[2] - 391:19, 392:7 rocks ^[1] - 502:20 role ^[14] - 343:5, 386:2, 415:8, 415:10, 415:22, 432:15, 434:4, 450:11, 450:12, 450:16, 451:18, 519:14, 520:3, 547:22 room ^[5] - 342:5, 434:17, 445:14, 445:15, 490:9 rotation ^[1] - 361:1 rotor ^[2] - 361:1, 400:11 rotors ^[2] - 360:1, 360:3 routes ^[1] - 550:24 row ^[1] - 488:4 royal ^[1] - 450:25 RPR ^[1] - 328:24 rule ^[4] - 353:5, 355:4, 560:6, 560:8 ruled ^[2] - 374:18, 374:21 rules ^[3] - 451:21, 468:15, 570:6 run ^[3] - 358:5, 390:15, 399:3 running ^[2] - 400:5, 577:1 runs ^[1] - 363:4 rural ^[3] - 490:3, 490:6, 490:15	584:6 sage ^[2] - 504:19, 527:16 sage-grouse ^[2] - 504:19, 527:16 sale ^[1] - 516:19 sales ^[1] - 343:20 SAM ^[1] - 331:3 Sam ^[4] - 333:12, 335:5, 338:17, 579:22 samples ^[5] - 411:18, 412:5, 412:19, 412:25, 413:6 SAPPINGTON ^[1] - 330:13 Sappington ^[2] - 336:6, 338:11 SARAH ^[1] - 330:13 Sarah ^[2] - 336:6, 338:11 satisfaction ^[1] - 554:16 satisfied ^[2] - 375:10, 567:15 satisfy ^[1] - 555:25 satisfying ^[1] - 392:1 saw ^[2] - 483:22, 506:6 SB16 ^[1] - 340:8 scale ^[1] - 435:13 scenario ^[1] - 428:24 Schaffer ^[4] - 514:7, 518:14, 530:1, 538:12 schedule ^[2] - 583:8, 583:13 schedules ^[1] - 583:14 scheme ^[2] - 510:8, 521:9 Schmeling ^[1] - 338:18 Schomer ^[1] - 340:13 school ^[4] - 365:13, 432:25, 433:3, 582:24 School ^[2] - 337:9, 432:14 SCHUMACHER ^[51] - 342:19, 342:23, 348:14, 349:2, 351:10, 355:11, 363:6, 363:12, 363:21, 363:23, 364:16, 365:2, 365:7, 366:5, 370:11, 372:11, 377:16, 384:1, 395:24, 401:25,	402:2, 403:12, 403:21, 404:4, 407:24, 414:10, 414:22, 415:2, 418:1, 430:25, 431:25, 495:25, 511:23, 512:2, 513:8, 540:2, 543:25, 551:4, 551:6, 551:21, 577:14, 578:9, 578:15, 578:20, 578:24, 579:1, 579:4, 579:8, 580:2, 580:9, 581:25 Schumacher ^[13] - 328:19, 330:9, 330:11, 330:14, 330:16, 331:11, 331:13, 331:16, 332:4, 332:10, 512:3, 512:10, 513:1 science ^[3] - 415:18, 415:19, 479:2 Science ^[1] - 450:22 sciences ^[3] - 450:24, 485:20, 486:3 scientific ^[10] - 433:25, 450:17, 451:12, 452:16, 452:17, 469:22, 515:4, 515:7, 527:4, 528:9 Scientific ^[1] - 335:15 scientifically ^[1] - 469:25 scientist ^[3] - 450:9, 465:14 Scope ^[1] - 337:18 scope ^[1] - 514:19 Scores ^[1] - 337:6 Scottish ^[1] - 337:19 SD ^[1] - 341:3 SDCL ^[1] - 555:7 SDSU ^[1] - 536:19 se ^[1] - 443:11 Search ^[4] - 341:3, 341:3, 341:4, 341:4 search ^[1] - 537:11 searching ^[1] - 536:13 season ^[2] - 508:17, 509:19 Second ^[3] - 334:7, 334:10, 336:15 second ^[6] - 365:20, 368:19, 411:12, 439:2, 475:3, 548:1 secondly ^[2] - 390:8, 532:8 section ^[5] - 409:11,	497:18, 498:7, 553:12 sections ^[2] - 336:20, 553:15 sector ^[1] - 509:9 see ^[56] - 348:17, 369:16, 383:7, 383:12, 384:4, 391:3, 391:5, 391:7, 392:24, 394:7, 395:5, 395:12, 396:2, 396:9, 397:19, 401:22, 419:5, 422:24, 426:22, 440:23, 448:11, 448:12, 449:2, 455:5, 456:5, 457:10, 467:7, 469:1, 477:18, 480:16, 481:13, 482:6, 484:17, 487:23, 489:23, 506:7, 508:18, 509:6, 515:12, 525:21, 526:5, 532:17, 533:25, 536:21, 543:20, 547:10, 554:17, 558:22, 559:13, 562:9, 564:10, 566:9, 569:24, 572:20, 579:3, 582:12 seeing ^[9] - 427:1, 477:4, 477:22, 507:21, 519:4, 531:2, 559:12, 583:6, 583:20 seem ^[8] - 387:13, 387:15, 387:20, 388:21, 442:11, 442:17, 443:24, 534:3 segment ^[1] - 446:8 Seizures ^[1] - 336:3 select ^[2] - 365:25, 403:2 selected ^[1] - 403:2 selecting ^[1] - 402:24 Self ^[3] - 335:8, 335:9, 337:5 self ^[6] - 441:1, 441:11, 477:4, 487:23, 487:25, 488:5 self-report ^[1] - 441:11 self-reported ^[4] - 477:4, 487:23, 487:25, 488:5	Self-Reported ^[3] - 335:8, 335:9, 337:5 self-reporting ^[1] - 441:1 semester ^[1] - 536:19 seminar ^[2] - 466:5, 470:13 semitruck ^[1] - 448:5 Senate ^[5] - 554:19, 555:6, 556:3, 564:23, 565:14 Senates ^[1] - 451:22 send ^[4] - 568:5, 572:24, 573:2, 582:20 senior ^[5] - 450:9, 465:13, 466:23, 472:8, 498:9 sense ^[5] - 388:22, 426:16, 484:1, 528:13, 533:25 sent ^[2] - 373:1, 379:11 sentence ^[5] - 486:21, 493:6, 516:4, 557:2, 557:5 separating ^[1] - 412:16 separation ^[1] - 462:3 series ^[3] - 393:14, 559:18, 580:20 serious ^[6] - 351:1, 369:19, 527:2, 527:4, 559:22, 561:22 serve ^[2] - 497:6, 505:3 served ^[4] - 497:11, 504:17, 578:21, 578:22 Service ^[4] - 334:3, 339:3, 339:7, 340:10 service ^[1] - 495:11 Service's ^[3] - 333:21, 333:22, 334:5 Services ^[2] - 451:14, 451:20 serving ^[1] - 576:2 session ^[1] - 540:21 Set ^[12] - 333:14, 334:7, 334:10, 334:11, 336:6, 336:8, 336:11, 336:12, 336:14, 336:15, 338:19, 338:22 set ^[12] - 408:23, 411:22, 421:7, 421:9, 454:14, 454:15, 455:4,
S				
S1 ^[1] - 340:3 S1-A ^[1] - 340:3 S2 ^[6] - 340:4, 553:3, 556:14, 558:24, 573:12, 573:13 S3 ^[3] - 340:4, 498:19, 573:16 S4 ^[2] - 340:5, 541:21 S5 ^[4] - 340:5, 340:6, 556:11, 556:13 S6 ^[3] - 340:6, 556:11, 556:13 S7 ^[2] - 340:7, 556:16 safe ^[2] - 438:20,				

<p>489:8, 499:4, 525:12, 565:25, 571:8</p> <p>Setback [1] - 337:3</p> <p>setback [5] - 462:13, 512:24, 521:25, 527:19, 538:24</p> <p>setbacks [9] - 433:18, 460:1, 464:20, 470:14, 471:5, 471:15, 471:21, 482:25, 528:2</p> <p>setoff [2] - 505:16, 506:11</p> <p>sets [1] - 405:21</p> <p>setting [8] - 354:6, 405:24, 411:9, 451:20, 486:6, 489:2, 492:21, 525:14</p> <p>Setting [1] - 337:15</p> <p>settings [1] - 444:4</p> <p>settle [1] - 527:7</p> <p>settlement [4] - 557:2, 557:25, 573:20, 573:24</p> <p>seven [26] - 361:15, 361:17, 364:1, 364:5, 364:23, 365:19, 365:24, 376:22, 377:4, 381:18, 381:20, 382:19, 390:25, 402:5, 402:7, 402:16, 403:1, 403:6, 405:20, 411:17, 454:7, 457:22, 457:24, 458:5, 514:3, 530:2</p> <p>several [8] - 435:9, 480:9, 502:11, 542:19, 543:15, 549:14, 559:16, 561:15</p> <p>Shadow [7] - 333:8, 335:4, 335:19, 336:4, 338:12, 339:18, 339:18</p> <p>shadow [66] - 343:7, 344:1, 346:16, 351:17, 355:16, 358:25, 359:1, 359:13, 360:4, 360:6, 360:7, 360:9, 360:14, 360:15, 360:17, 360:19, 361:2, 361:4, 361:9, 361:11, 361:18, 362:2, 362:15, 362:23, 365:12,</p>	<p>378:7, 378:8, 378:11, 378:13, 378:18, 379:1, 379:14, 379:15, 379:18, 380:18, 385:25, 394:17, 399:8, 399:10, 399:19, 400:12, 400:13, 401:9, 415:23, 433:22, 444:1, 452:25, 454:19, 454:20, 455:2, 455:5, 455:6, 455:9, 455:11, 455:17, 458:6, 471:13, 483:23, 484:7, 484:11, 484:15, 484:17, 493:7, 575:1, 575:21, 577:23</p> <p>shadow's [1] - 401:10</p> <p>shadows [3] - 359:19, 399:22, 484:8</p> <p>shakedown [1] - 437:12</p> <p>shall [2] - 409:19, 557:8</p> <p>shan't [1] - 386:17</p> <p>shaped [1] - 516:18</p> <p>shapes [1] - 502:3</p> <p>share [3] - 528:9, 532:6, 535:19</p> <p>shared [1] - 518:25</p> <p>sharp [15] - 503:13, 503:16, 504:3, 504:6, 504:19, 504:22, 505:2, 527:15, 535:7, 535:22, 535:24, 536:1, 536:4, 536:6, 536:15</p> <p>sharp-tailed [15] - 503:13, 503:16, 504:3, 504:6, 504:19, 504:22, 505:2, 527:15, 535:7, 535:22, 535:24, 536:1, 536:4, 536:6, 536:15</p> <p>shelter [1] - 387:16</p> <p>shining [1] - 399:4</p> <p>Shirley [1] - 340:11</p> <p>short [15] - 343:8, 352:11, 356:25, 358:24, 392:18, 410:10, 410:12, 415:14, 416:16, 432:19, 433:12, 450:19, 452:14, 540:20, 572:3</p>	<p>shorter [1] - 423:25</p> <p>shorthand [2] - 585:9</p> <p>shortly [1] - 575:10</p> <p>show [28] - 362:14, 364:11, 364:12, 365:14, 366:20, 368:5, 370:15, 378:19, 381:7, 385:20, 392:7, 403:19, 419:6, 420:7, 429:13, 494:16, 494:18, 496:13, 507:21, 518:10, 531:13, 546:13, 549:22, 567:10, 569:17, 582:6</p> <p>showed [2] - 402:8, 514:3</p> <p>showing [7] - 364:1, 364:3, 364:6, 364:9, 392:9, 508:1, 546:20</p> <p>shown [5] - 434:6, 434:10, 437:4, 507:6, 527:21</p> <p>shows [13] - 364:6, 364:17, 364:20, 364:22, 365:22, 367:9, 375:25, 377:6, 377:8, 426:13, 530:2, 538:17, 547:13</p> <p>shut [2] - 531:6, 531:20</p> <p>shutdown [3] - 412:10, 413:8, 413:23</p> <p>shutting [1] - 413:15</p> <p>sic [2] - 502:18, 534:15</p> <p>Sick [1] - 340:15</p> <p>side [3] - 383:9, 390:7, 510:18</p> <p>sides [1] - 584:12</p> <p>sign [5] - 361:16, 371:24, 375:8, 564:11, 566:5</p> <p>signature [4] - 347:17, 373:5, 373:7, 374:19</p> <p>signed [5] - 347:8, 347:12, 373:2, 441:10, 442:12</p> <p>significant [19] - 350:2, 350:10, 366:1, 383:14, 391:3, 418:21, 426:21, 434:4, 461:11, 464:6, 486:22, 487:1, 487:4, 487:16,</p>	<p>488:20, 491:10, 499:15, 501:1, 503:2</p> <p>significantly [1] - 426:25</p> <p>silent [1] - 442:23</p> <p>similar [14] - 423:22, 424:12, 436:17, 436:19, 437:17, 455:3, 455:20, 456:9, 472:6, 490:4, 507:17, 510:11, 554:7, 583:14</p> <p>simple [1] - 535:14</p> <p>simply [10] - 390:16, 391:7, 407:14, 437:9, 454:21, 454:23, 476:5, 533:12, 554:2, 584:9</p> <p>single [3] - 400:6, 489:9, 505:22</p> <p>sit [3] - 489:18, 548:5, 572:15</p> <p>site [5] - 343:18, 453:15, 510:10, 525:19, 570:8</p> <p>sited [4] - 453:13, 453:25, 457:16, 582:8</p> <p>sites [6] - 363:3, 406:23, 451:7, 501:2, 509:1, 543:14</p> <p>Siting [2] - 334:6, 338:24</p> <p>siting [11] - 450:17, 451:17, 451:24, 452:20, 452:22, 472:2, 552:22, 552:23, 561:25, 572:10, 572:23</p> <p>sitting [2] - 442:15, 572:13</p> <p>situation [6] - 421:12, 421:16, 421:18, 421:21, 429:21, 495:7</p> <p>situations [2] - 520:17, 521:24</p> <p>six [12] - 343:10, 394:9, 394:10, 402:9, 402:10, 428:13, 451:11, 481:3, 481:18, 482:11, 487:14, 583:15</p> <p>six-month [1] - 583:15</p> <p>Sixth [1] - 338:22</p> <p>size [1] - 503:18</p> <p>skip [1] - 550:9</p> <p>skipper [1] - 333:5</p> <p>skipperling [1] - 333:5</p>	<p>skipping [1] - 492:23 36</p> <p>sleep [48] - 425:22, 425:24, 426:3, 435:16, 441:21, 453:10, 466:5, 466:14, 466:20, 466:24, 467:5, 467:6, 467:10, 467:13, 468:11, 476:13, 476:14, 476:18, 477:4, 477:12, 477:15, 477:20, 477:21, 486:8, 486:11, 486:18, 486:19, 486:22, 487:20, 487:21, 487:25, 488:6, 488:7, 488:14, 488:20, 488:24, 489:4, 490:3, 490:8, 490:21, 492:2, 492:5, 492:13, 492:16, 492:22</p> <p>Sleep [3] - 335:8, 335:9, 335:11</p> <p>slide [8] - 465:7, 465:10, 470:16, 470:18, 470:20, 470:24, 471:8</p> <p>slides [1] - 470:22</p> <p>slight [1] - 409:16</p> <p>slightly [1] - 420:17</p> <p>slow [1] - 419:23</p> <p>small [5] - 426:22, 430:2, 465:14, 490:5, 516:6</p> <p>smoke [1] - 445:6</p> <p>smoking [1] - 436:11</p> <p>so-called [3] - 405:19, 411:7, 516:16</p> <p>Society [1] - 541:8</p> <p>software [10] - 343:21, 343:22, 351:14, 419:14, 419:15, 419:16, 419:20, 420:1, 420:3, 420:5</p> <p>Soil [1] - 336:21</p> <p>sole [2] - 343:20, 533:9</p> <p>solely [2] - 369:8, 371:7</p> <p>someone [4] - 342:13, 346:10, 384:12, 402:21</p> <p>sometimes [4] - 411:16, 421:3, 518:2, 519:18</p> <p>somewhat [2] - 494:24, 523:8</p>
---	---	---	---	--

<p>son [1] - 536:18</p> <p>soon [1] - 351:21</p> <p>sophisticated [1] - 371:13</p> <p>sorry [25] - 355:3, 362:21, 366:13, 377:7, 381:9, 384:7, 396:4, 396:19, 402:20, 408:16, 419:24, 424:5, 458:23, 463:2, 465:5, 470:20, 479:24, 480:15, 480:17, 482:17, 511:17, 530:9, 536:22, 547:1, 578:9</p> <p>sort [9] - 359:22, 385:6, 407:1, 419:2, 426:10, 449:4, 513:24, 550:16, 579:16</p> <p>Sorted [4] - 335:3, 338:15, 338:16, 338:17</p> <p>sorts [1] - 398:3</p> <p>sought [1] - 444:19</p> <p>sound [138] - 345:12, 347:12, 351:16, 355:12, 355:13, 357:1, 357:3, 357:14, 357:15, 357:22, 361:18, 362:2, 362:14, 363:25, 364:3, 365:12, 366:20, 367:2, 371:16, 372:24, 375:19, 375:22, 376:25, 380:18, 383:13, 383:19, 384:4, 385:17, 386:7, 386:12, 386:24, 387:1, 390:25, 391:3, 393:10, 393:17, 393:19, 397:22, 401:9, 401:11, 403:9, 405:14, 405:25, 406:9, 406:11, 406:14, 406:20, 406:21, 406:22, 406:25, 407:1, 408:13, 409:15, 415:12, 415:24, 416:1, 416:6, 416:8, 416:19, 416:22, 416:23, 416:25, 417:4, 417:7, 417:13, 417:16, 417:19, 417:21,</p>	<p>417:25, 418:12, 418:16, 418:20, 418:25, 420:3, 420:7, 420:14, 421:4, 421:5, 421:15, 421:16, 422:22, 423:6, 423:7, 423:9, 423:15, 423:16, 423:19, 424:15, 424:22, 425:2, 425:12, 425:16, 426:13, 426:17, 427:22, 429:11, 429:12, 433:22, 434:24, 434:25, 435:6, 435:12, 436:13, 440:2, 440:5, 451:21, 452:24, 453:12, 453:13, 453:20, 453:23, 454:15, 456:13, 456:14, 457:18, 457:23, 458:4, 460:2, 460:8, 460:13, 460:21, 463:13, 468:12, 472:10, 474:15, 477:1, 481:6, 481:20, 482:25, 486:7, 490:15, 492:17, 522:12, 535:10, 577:18</p> <p>Sound [23] - 333:8, 334:24, 335:3, 335:9, 338:5, 338:5, 338:6, 338:8, 338:13, 338:14, 338:15, 338:15, 338:16, 338:16, 339:8, 339:11, 339:11, 339:15, 340:12, 340:23, 341:7, 341:9, 341:11</p> <p>sound-based [1] - 460:2</p> <p>sounds [8] - 387:18, 425:3, 490:11, 490:12, 490:13, 562:20, 563:12, 568:16</p> <p>source [3] - 456:18, 486:7, 489:11</p> <p>Sources [3] - 335:14, 335:16, 337:11</p> <p>sources [4] - 438:4, 438:15, 490:15</p> <p>SOUTH [2] - 328:2, 585:1</p> <p>South [33] - 328:24,</p>	<p>329:2, 329:4, 345:6, 345:8, 346:6, 346:12, 346:24, 347:23, 350:6, 350:8, 394:8, 427:6, 439:22, 458:18, 458:19, 490:4, 497:8, 497:10, 497:23, 498:1, 501:11, 502:22, 503:20, 503:23, 504:16, 514:8, 541:7, 569:23, 570:3, 585:7, 585:13</p> <p>southeast [1] - 504:1</p> <p>southern [1] - 495:10</p> <p>southwest [1] - 530:23</p> <p>space [2] - 483:23, 484:2</p> <p>span [4] - 428:14, 499:19, 510:2, 532:1</p> <p>sparse [1] - 503:25</p> <p>speaking [1] - 384:23</p> <p>speaks [1] - 496:10</p> <p>special [5] - 443:24, 444:1, 444:23, 446:16, 502:23</p> <p>specialties [2] - 447:17, 447:18</p> <p>species [28] - 497:21, 500:8, 503:3, 503:8, 503:17, 503:21, 504:18, 505:7, 507:24, 508:7, 513:24, 514:3, 514:10, 514:11, 514:16, 515:6, 519:4, 522:11, 523:13, 527:14, 528:3, 528:14, 530:2, 530:3, 530:6, 530:18, 534:25, 538:16</p> <p>specific [11] - 364:21, 395:1, 409:18, 416:19, 434:13, 456:14, 495:12, 528:9, 530:12, 551:13, 556:3</p> <p>specifically [13] - 454:13, 456:4, 462:11, 462:21, 465:1, 466:20, 476:1, 476:5, 484:11, 500:4, 509:4, 551:14, 565:5</p> <p>specifications [2] - 357:5, 359:3</p> <p>specifics [3] - 469:21,</p>	<p>504:12, 528:24</p> <p>specified [2] - 386:10, 412:4</p> <p>specify [1] - 505:20</p> <p>speed [6] - 359:7, 360:25, 411:12, 411:13, 412:3</p> <p>spelled [1] - 450:7</p> <p>spend [2] - 388:13, 536:11</p> <p>spends [1] - 400:16</p> <p>spent [5] - 343:10, 461:11, 504:15, 527:3, 559:17</p> <p>spike [1] - 477:24</p> <p>spikes [1] - 476:19</p> <p>spin [1] - 454:24</p> <p>spinning [2] - 469:9</p> <p>spoken [1] - 522:10</p> <p>spot [2] - 424:21, 574:18</p> <p>spring [3] - 505:10, 509:19, 509:24</p> <p>SS [1] - 585:2</p> <p>staff [12] - 342:7, 498:8, 498:12, 498:14, 499:18, 506:1, 515:10, 515:20, 520:23, 525:11, 525:19, 552:21</p> <p>STAFF [4] - 328:13, 330:2, 332:2, 340:2</p> <p>Staff [78] - 328:22, 334:19, 336:13, 336:25, 339:14, 340:5, 340:6, 340:6, 352:14, 354:11, 363:14, 364:10, 370:22, 375:14, 377:18, 378:1, 378:6, 380:12, 381:7, 402:3, 403:25, 405:18, 407:5, 408:5, 408:10, 408:13, 409:5, 409:9, 411:1, 414:13, 418:8, 431:7, 435:25, 447:10, 483:18, 493:21, 494:22, 496:25, 497:3, 497:21, 498:19, 505:18, 508:11, 511:1, 530:25, 538:7, 539:12, 540:9, 540:22, 540:23, 552:1, 552:7, 552:9, 553:3, 556:2, 556:6, 557:7,</p>	<p>558:11, 559:16, 565:10, 565:25, 567:3, 567:19, 568:2, 568:17, 571:4, 572:5, 572:15, 572:18, 573:22, 574:13, 574:16, 579:13, 580:4, 580:21, 581:2, 582:15</p> <p>Staff's [23] - 333:14, 334:7, 334:10, 336:6, 336:8, 336:10, 336:12, 336:22, 338:22, 340:3, 340:7, 414:8, 536:22, 556:18, 559:7, 560:4, 561:18, 565:22, 566:11, 567:14, 568:9, 569:14, 569:25</p> <p>stage [1] - 560:1</p> <p>stamp [1] - 345:21</p> <p>stamped [4] - 344:9, 346:11, 346:13, 353:13</p> <p>stamping [2] - 346:16, 349:5</p> <p>stand [8] - 367:12, 369:22, 371:19, 372:1, 407:20, 421:14, 460:24</p> <p>stand-alone [1] - 421:14</p> <p>standard [19] - 343:17, 369:14, 370:12, 370:15, 371:10, 373:5, 385:11, 385:12, 385:18, 385:20, 419:21, 419:24, 453:20, 454:2, 462:16, 486:7, 535:14, 535:15, 554:16</p> <p>standardized [1] - 419:10</p> <p>Standards [1] - 339:9</p> <p>standards [5] - 343:16, 385:8, 409:19, 409:20, 492:18</p> <p>standing [4] - 355:1, 403:23, 484:1, 484:18</p> <p>standpoint [15] - 354:19, 387:1, 424:23, 482:3, 500:19, 505:3,</p>
---	---	---	--	--

506:15, 509:13, 514:12, 519:1, 528:14, 533:13, 535:4, 535:6, 584:4 stare [1] - 426:18 start [9] - 360:15, 410:11, 443:16, 458:21, 472:16, 473:25, 476:8, 480:18, 526:14 started [6] - 363:10, 415:16, 428:15, 451:5, 477:4, 546:24 starting [4] - 355:12, 461:10, 476:10, 478:7 starts [3] - 421:6, 475:17, 480:15 state [55] - 342:24, 346:3, 369:1, 369:6, 415:3, 415:17, 423:5, 427:12, 432:10, 437:23, 450:5, 453:18, 455:13, 463:12, 463:20, 464:20, 465:23, 466:12, 470:13, 471:2, 472:9, 481:5, 486:5, 486:9, 496:22, 497:4, 503:24, 504:2, 504:5, 505:23, 510:6, 511:10, 514:2, 518:23, 519:12, 519:14, 522:25, 523:22, 524:8, 524:11, 524:15, 528:2, 530:16, 530:23, 536:14, 536:16, 541:3, 541:12, 541:14, 552:13, 554:15, 562:1, 563:9 STATE [2] - 328:2, 585:1 State [12] - 329:3, 344:4, 345:5, 346:12, 497:10, 497:23, 498:1, 504:16, 541:7, 566:12, 569:23, 585:7 State's [2] - 570:15, 570:17 Statement [2] - 340:20, 340:21 statement [27] - 346:24, 368:23, 369:11, 425:19, 426:5, 438:8, 443:13, 458:23, 459:1, 459:5, 459:11, 459:12, 459:22, 460:18, 463:11, 468:2, 474:14, 480:21, 494:15, 494:16, 494:18, 500:1, 500:18, 500:23, 508:19, 516:3 statements [2] - 445:11, 446:2 states [1] - 463:19 States [6] - 415:21, 435:2, 453:5, 453:16, 486:15, 503:1 statewide [1] - 511:12 Statin [1] - 337:22 statistical [1] - 515:8 statistically [8] - 486:22, 486:25, 487:4, 487:16, 488:19, 491:7, 491:10, 491:19 Status [8] - 333:20, 333:21, 334:24, 335:5, 339:9, 339:10, 339:12, 339:12 status [14] - 344:2, 344:3, 346:3, 347:22, 347:24, 347:25, 348:17, 349:4, 350:20, 357:10, 364:5, 364:12, 364:14, 576:22 statute [1] - 462:9 statutes [2] - 453:19, 455:13 statutory [1] - 472:25 step [9] - 407:25, 410:7, 414:18, 429:15, 432:1, 493:24, 540:12, 552:3, 574:10 stickies [1] - 576:16 sticking [1] - 567:6 still [20] - 362:2, 362:3, 395:11, 396:25, 419:11, 419:25, 420:1, 420:21, 429:13, 457:9, 460:4, 460:10, 473:23, 474:18, 504:6, 526:19, 526:23, 562:8, 564:9, 582:8	stimulus [1] - 443:25 stipulate [1] - 349:20 stipulated [6] - 408:12, 420:24, 541:21, 553:2, 556:12, 556:16 stipulation [2] - 580:3, 580:24 Stipulation [1] - 339:14 stops [1] - 424:20 storm [1] - 389:16 storms [1] - 389:17 Strandburg [1] - 392:8 Strategy [1] - 334:4 stress [1] - 441:20 stress/annoyance [1] - 480:15 stricken [2] - 350:17, 351:6 strike [4] - 355:6, 469:15, 482:23, 573:18 stringent [2] - 401:13, 454:1 strong [1] - 512:7 stronger [1] - 532:11 structure [5] - 358:1, 358:2, 376:19, 406:5, 484:25 Structures [2] - 341:10, 341:11 structures [11] - 358:13, 358:14, 358:16, 358:21, 376:7, 376:9, 376:23, 405:7, 405:17, 407:17, 506:16 struggle [2] - 445:10, 445:13 students [1] - 485:22 studied [4] - 409:3, 438:1, 487:21, 548:9 studies [60] - 343:7, 344:1, 346:16, 351:12, 351:17, 351:24, 355:13, 357:1, 358:18, 358:25, 361:18, 361:25, 362:2, 363:1, 384:12, 394:1, 417:10, 418:16, 419:9, 425:8, 434:6, 435:2, 435:5, 435:8, 436:12, 436:18, 436:20, 437:4, 438:2, 438:3, 438:11, 439:8, 440:20, 451:11, 453:12, 456:1, 476:13, 477:15, 477:16, 477:20, 478:18, 478:19, 479:3, 479:11, 479:12, 479:17, 506:25, 507:4, 507:6, 507:16, 507:18, 512:24, 514:18, 527:13, 538:1, 548:22, 551:9, 551:18 Studies [3] - 333:9, 333:10, 337:18 Study [16] - 334:24, 335:4, 335:10, 337:14, 337:19, 338:7, 437:7, 437:23, 441:25, 456:3, 457:3, 474:6, 474:9, 477:14, 479:10, 487:7 study [65] - 349:24, 355:13, 357:3, 361:6, 362:22, 362:23, 369:19, 370:20, 372:25, 383:19, 385:22, 395:10, 409:15, 409:24, 417:9, 421:15, 421:17, 436:6, 437:6, 437:24, 441:18, 446:7, 446:8, 453:2, 455:15, 461:18, 466:19, 474:7, 476:18, 478:13, 478:24, 479:10, 479:23, 487:8, 508:2, 508:16, 509:10, 514:6, 514:15, 514:19, 514:21, 514:23, 514:25, 515:19, 516:7, 516:12, 516:13, 517:15, 517:17, 518:4, 518:15, 518:16, 518:20, 518:21, 519:4, 530:3, 537:25, 538:11, 538:12, 538:14, 538:17, 538:24, 547:19, 547:22, 549:5 study's [1] - 490:16 studying [2] - 439:8, 477:21 stuff [3] - 342:9, 525:1, 559:22	38 Sub [1] - 555:7 subjective [6] - 441:16, 441:23, 453:8, 471:18, 476:23, 489:1 submit [5] - 355:6, 541:15, 552:25, 556:8, 559:10 submittals [1] - 356:2 submitted [11] - 344:16, 370:8, 372:20, 373:11, 378:10, 432:17, 511:6, 573:22, 576:13, 576:24, 577:5 submitting [2] - 511:6, 578:12 subparagraph [1] - 460:19 Subpart [1] - 409:17 subsequent [1] - 473:16 subsequently [1] - 393:18 subset [1] - 487:19 substantial [3] - 500:20, 504:15, 532:19 subtle [1] - 429:9 sudden [1] - 533:10 suffer [2] - 435:15, 486:11 sufficient [6] - 412:24, 462:4, 462:13, 462:18, 472:19, 553:23 sufficiently [1] - 523:24 suggest [9] - 434:1, 460:12, 460:22, 464:5, 464:12, 481:22, 517:4, 517:5, 517:10 suggested [1] - 394:17 suggestion [2] - 376:21, 410:1 suggestions [6] - 405:13, 406:4, 519:16, 519:18, 519:24, 520:6 suggests [1] - 463:25 suitability [1] - 343:18 SULLY [1] - 585:3 summarize [2] - 417:7, 543:8 summarizes [1] - 516:5
---	---	---

<p>summary ^[6] - 356:25, 358:24, 416:16, 433:12, 435:18, 452:14</p> <p>sun ^[11] - 360:3, 360:8, 360:15, 360:16, 399:4, 400:11, 484:3, 484:6, 484:10, 484:19, 484:20</p> <p>Suncor ^[2] - 340:20, 340:21</p> <p>Sunday ^[1] - 446:17</p> <p>sunflower ^[1] - 400:12</p> <p>sunny ^[1] - 359:9</p> <p>sunshine ^[9] - 359:8, 360:20, 360:21, 398:19, 398:20, 398:22, 398:24, 399:2, 399:7</p> <p>supersede ^[1] - 570:15</p> <p>superseded ^[1] - 355:25</p> <p>supervise ^[1] - 485:21</p> <p>supervising ^[1] - 367:15</p> <p>supplant ^[1] - 570:17</p> <p>Supplement ^[5] - 334:9, 334:10, 334:21, 334:21, 334:22</p> <p>supplement ^[3] - 395:21, 396:10</p> <p>Supplemental ^[15] - 333:13, 334:22, 334:23, 334:23, 335:4, 335:5, 335:6, 336:10, 336:22, 340:6, 356:9, 451:25, 454:4, 466:18, 466:25</p> <p>supplemental ^[3] - 350:14, 373:2, 551:8</p> <p>supplemented ^[1] - 441:24</p> <p>supplied ^[2] - 574:23, 574:24</p> <p>supply ^[2] - 581:20, 581:21</p> <p>support ^[20] - 343:20, 442:19, 454:5, 460:13, 460:23, 463:16, 464:1, 464:4, 464:12, 464:18, 466:3, 472:19, 472:24, 473:22, 474:3, 474:11, 474:18, 481:23, 482:5,</p>	<p>569:15</p> <p>Support ^[2] - 337:12, 338:4</p> <p>supported ^[2] - 464:23, 483:3</p> <p>supporting ^[1] - 373:1</p> <p>supposed ^[3] - 345:18, 443:17, 491:1</p> <p>Surficial ^[1] - 336:19</p> <p>surprised ^[2] - 494:24, 503:10</p> <p>Survey ^[7] - 333:5, 333:6, 333:6, 333:7, 337:5, 340:10, 515:16</p> <p>survey ^[30] - 347:13, 349:24, 387:5, 388:14, 406:9, 406:11, 406:14, 478:23, 509:5, 516:3, 516:22, 517:7, 525:13, 534:4, 535:4, 537:16, 542:2, 542:4, 542:18, 543:9, 543:20, 544:22, 544:24, 550:21, 550:22, 562:18, 563:11, 563:15, 564:1</p> <p>survey's ^[1] - 413:4</p> <p>surveyed ^[2] - 453:6, 509:21</p> <p>surveying ^[3] - 509:15, 510:4</p> <p>surveys ^[30] - 393:19, 428:7, 456:8, 509:25, 511:2, 511:3, 513:20, 513:23, 515:3, 515:5, 516:6, 516:25, 526:1, 533:7, 534:15, 534:18, 534:19, 534:21, 534:22, 534:24, 535:2, 535:15, 536:6, 539:13, 542:13, 563:1, 563:4, 563:6</p> <p>suspect ^[5] - 347:7, 364:10, 423:24, 491:4, 571:3</p> <p>sustain ^[3] - 349:14, 468:3, 482:21</p> <p>sustainability ^[1] - 505:14</p> <p>SWCA ^[2] - 515:19, 548:7</p> <p>swear ^[1] - 496:18</p>	<p>Sweden ^[1] - 476:16</p> <p>Sweetland ^[1] - 511:17</p> <p>switch ^[1] - 457:24</p> <p>syndrome ^[1] - 444:7</p> <p>Systems ^[1] - 336:24</p>	<p>team ^[4] - 397:3, 402:22, 403:7, 552:21</p> <p>technical ^[2] - 343:15, 384:25</p> <p>Technical ^[1] - 336:23</p> <p>technology ^[1] - 351:17</p> <p>Telecommunication ^[1] - 333:10</p> <p>teleconference ^[1] - 410:13</p> <p>telephone ^[1] - 495:1</p> <p>telephonically ^[1] - 496:15</p> <p>temperature ^[1] - 575:19</p> <p>temporary ^[2] - 423:7, 424:18</p> <p>tempted ^[1] - 550:7</p> <p>tender ^[4] - 418:2, 511:19, 543:22, 557:14</p> <p>tends ^[3] - 354:7, 440:8, 456:20</p> <p>term ^[5] - 350:7, 440:7, 484:13, 484:21, 493:3</p> <p>terms ^[7] - 349:13, 358:9, 440:7, 440:9, 500:12, 508:9, 558:18</p> <p>terrain ^[2] - 357:6, 359:11</p> <p>terrestrial ^[2] - 497:18</p> <p>terrestrial-based ^[1] - 497:18</p> <p>test ^[6] - 386:20, 386:25, 409:11, 413:18, 452:19, 457:16</p> <p>testified ^[15] - 374:13, 379:24, 386:13, 397:21, 405:4, 437:15, 437:16, 437:17, 437:19, 473:10, 473:12, 520:14, 563:22, 579:18, 584:1</p> <p>testify ^[2] - 386:14, 495:5</p> <p>testifying ^[4] - 442:23, 458:18, 550:8, 550:11</p> <p>testimony ^[100] - 344:15, 349:21, 349:22, 350:13, 350:19, 352:2, 352:24, 354:14, 354:22, 355:6,</p>	<p>355:25, 356:14, 356:23, 357:1, 358:25, 362:18, 367:20, 374:10, 394:18, 395:11, 395:12, 395:15, 395:21, 396:10, 406:7, 415:11, 416:14, 416:17, 416:18, 417:1, 417:5, 417:10, 422:9, 422:10, 422:13, 422:15, 425:1, 430:4, 433:10, 433:13, 433:14, 437:15, 437:22, 445:17, 446:12, 452:5, 452:12, 452:15, 453:2, 454:20, 460:1, 460:6, 460:12, 461:15, 461:21, 461:22, 462:1, 462:7, 462:23, 463:5, 463:6, 463:11, 469:15, 472:8, 486:4, 487:6, 492:9, 493:12, 493:23, 495:15, 512:7, 512:23, 514:1, 515:2, 519:12, 526:9, 529:9, 534:13, 538:22, 541:15, 541:22, 542:1, 542:11, 543:8, 549:15, 552:25, 553:7, 553:11, 553:16, 554:14, 558:4, 558:7, 559:11, 560:20, 561:9, 564:22, 569:17, 573:11, 573:13, 573:22</p> <p>Testimony ^[42] - 333:11, 333:11, 333:12, 334:22, 334:23, 336:5, 336:23, 337:4, 337:13, 337:16, 338:6, 338:11, 338:12, 338:17, 338:24, 340:3, 340:4, 340:4, 340:5, 344:12, 355:19, 355:23, 356:9, 356:17, 395:19, 416:9, 422:25, 433:5, 451:25, 452:7, 454:4,</p>
---	---	---	---	---

<p>466:19, 466:25, 483:22, 489:25, 498:16, 498:23, 499:9, 538:10, 553:15, 558:23, 569:13</p> <p>testing [6] - 388:20, 411:19, 412:1, 412:9, 423:15, 423:16</p> <p>tests [2] - 412:23, 413:8</p> <p>Texas [1] - 463:21</p> <p>THE [209] - 328:1, 328:2, 328:4, 328:11, 345:1, 345:3, 345:7, 345:10, 345:16, 346:2, 346:8, 346:10, 347:1, 347:11, 347:15, 347:25, 348:4, 348:9, 353:11, 353:25, 354:3, 366:18, 366:22, 366:25, 367:5, 367:11, 367:14, 367:18, 367:21, 368:8, 368:14, 368:18, 368:25, 369:5, 369:10, 369:14, 384:22, 385:11, 385:16, 385:18, 386:16, 387:3, 387:24, 388:2, 388:23, 389:6, 389:20, 390:3, 390:10, 390:18, 390:23, 391:9, 391:20, 391:23, 392:6, 392:10, 392:16, 392:21, 393:3, 393:12, 393:20, 394:20, 394:25, 395:18, 395:23, 396:1, 396:4, 396:8, 396:11, 396:14, 396:19, 396:23, 397:3, 397:13, 397:17, 398:6, 398:13, 398:22, 399:15, 399:18, 399:25, 400:2, 400:10, 400:23, 401:1, 401:4, 401:10, 402:20, 404:9, 407:12, 407:22, 411:7, 413:2, 413:18, 414:5, 414:19,</p>	<p>422:4, 422:10, 422:12, 422:16, 422:20, 423:13, 423:16, 423:21, 424:1, 424:5, 424:11, 424:25, 425:19, 426:4, 426:7, 426:18, 427:15, 428:9, 428:15, 428:19, 429:6, 430:6, 430:9, 430:14, 430:16, 430:23, 432:3, 439:6, 439:10, 439:17, 439:21, 439:23, 440:1, 440:4, 440:14, 441:12, 442:19, 443:2, 443:7, 443:18, 444:3, 445:22, 446:13, 446:25, 449:21, 485:14, 485:19, 486:1, 487:5, 487:12, 491:1, 491:9, 491:21, 492:11, 493:13, 493:25, 518:1, 518:13, 518:18, 519:21, 520:20, 522:16, 523:25, 525:10, 526:10, 526:15, 526:20, 527:10, 528:21, 529:2, 529:15, 530:4, 530:11, 530:16, 531:11, 532:22, 533:6, 534:10, 534:20, 536:24, 537:7, 540:14, 548:18, 548:25, 549:6, 549:10, 549:17, 549:20, 549:23, 550:10, 551:22, 552:5, 561:1, 562:23, 563:19, 564:18, 565:2, 565:19, 565:22, 566:23, 567:11, 567:17, 567:24, 568:1, 568:7, 568:24, 569:5, 569:8, 569:11, 569:25, 571:3, 571:17</p> <p>themselves [7] - 500:9, 501:10, 511:14, 514:13, 533:7, 536:17, 553:24</p>	<p>thereafter [1] - 546:3</p> <p>therefore [10] - 360:6, 361:2, 370:7, 399:22, 417:23, 423:6, 441:4, 553:3, 566:2, 570:3</p> <p>they've [6] - 365:17, 456:3, 501:18, 542:17, 543:13, 550:25</p> <p>thinking [2] - 472:16, 566:20</p> <p>Third [2] - 336:6, 336:14</p> <p>third [1] - 528:20</p> <p>Thomas [1] - 432:24</p> <p>THOMPSON [1] - 331:7</p> <p>Thompson [4] - 333:12, 334:22, 336:23, 582:21</p> <p>thorough [3] - 535:6, 536:11, 536:13</p> <p>thousand [1] - 455:8</p> <p>thousands [2] - 443:15</p> <p>threat [1] - 454:18</p> <p>threatened [1] - 497:21</p> <p>three [17] - 360:16, 377:22, 433:21, 433:24, 445:7, 446:17, 452:21, 459:23, 467:25, 474:2, 487:8, 488:8, 504:16, 509:19, 510:1, 531:20, 532:1</p> <p>three-hour [2] - 510:1, 532:1</p> <p>three-month [1] - 531:20</p> <p>threshold [2] - 454:17, 454:25</p> <p>throughout [6] - 349:25, 350:22, 363:1, 440:21, 504:14, 550:15</p> <p>throw [1] - 449:13</p> <p>Thursday [1] - 394:16</p> <p>Thyen [3] - 340:22, 340:22, 340:23</p> <p>tied [1] - 579:21</p> <p>time-consuming [1] - 535:5</p> <p>timing [2] - 394:14, 394:18</p> <p>title [16] - 342:24, 343:1, 345:14, 347:20, 351:22, 354:3, 354:8, 354:9,</p>	<p>369:15, 415:3, 432:10, 450:5, 470:20, 470:24, 541:9, 552:17</p> <p>today [22] - 451:10, 453:17, 460:5, 460:10, 460:24, 464:10, 466:2, 471:11, 473:20, 479:7, 479:16, 479:21, 495:21, 498:23, 526:13, 526:22, 534:14, 540:16, 541:22, 562:15, 577:15, 578:24</p> <p>together [4] - 481:18, 549:4, 564:10, 577:1</p> <p>tolerate [3] - 440:13, 440:15, 441:8</p> <p>TOM [1] - 332:3</p> <p>Tom [6] - 340:4, 494:25, 496:23, 497:6, 526:11, 540:12</p> <p>tomorrow [5] - 404:8, 404:9, 495:19, 495:22, 581:22</p> <p>took [6] - 392:14, 409:18, 562:10, 565:4, 580:20, 585:9</p> <p>top [10] - 396:15, 470:20, 472:4, 487:24, 488:1, 511:16, 513:22, 528:21, 530:5, 530:12</p> <p>topic [1] - 527:12</p> <p>Topographic [1] - 336:19</p> <p>topography [1] - 524:16</p> <p>Toronto [3] - 451:3, 465:15, 485:21</p> <p>total [3] - 388:8, 412:13, 488:9</p> <p>totality [1] - 510:12</p> <p>totally [1] - 521:1</p> <p>tough [2] - 394:8, 495:12</p> <p>Toward [1] - 337:6</p> <p>toward [1] - 434:8</p> <p>towards [5] - 370:24, 374:4, 436:25, 475:18, 549:19</p> <p>tower [4] - 397:11, 397:12, 400:24, 430:5</p> <p>Tower [1] - 334:5</p> <p>towers [1] - 430:21</p>	<p>traced [1] - 391:11</p> <p>track [2] - 398:24, 403:4</p> <p>tracts [1] - 502:6</p> <p>traditional [1] - 543:11</p> <p>Traffic [2] - 338:5, 338:6</p> <p>traffic [1] - 490:12</p> <p>trained [4] - 343:24, 351:13, 432:25, 447:23</p> <p>training [2] - 352:16, 353:2</p> <p>transcript [4] - 329:1, 346:21, 537:20, 538:3</p> <p>Transcript [3] - 328:7, 339:7, 340:18</p> <p>transcription [1] - 585:12</p> <p>transects [1] - 535:2</p> <p>transfer [1] - 565:4</p> <p>transmission [2] - 357:22, 552:22</p> <p>transportation [1] - 438:5</p> <p>travels [2] - 426:17, 584:7</p> <p>treat [3] - 444:18, 448:10, 448:15</p> <p>treated [1] - 448:12</p> <p>Treatment [1] - 337:20</p> <p>treats [1] - 444:17</p> <p>trees [2] - 359:23, 400:3</p> <p>trends [1] - 533:25</p> <p>tribes [4] - 464:3, 543:10, 548:21, 549:4</p> <p>tried [4] - 440:4, 446:8, 558:20, 569:11</p> <p>trigger [3] - 380:15, 380:17, 380:20</p> <p>triggered [1] - 380:12</p> <p>triggers [1] - 454:25</p> <p>true [9] - 345:11, 346:4, 346:18, 369:11, 373:9, 446:3, 553:8, 558:12, 585:11</p> <p>try [9] - 387:24, 448:7, 449:22, 474:18, 514:8, 515:12, 545:8, 561:10, 572:19</p> <p>trying [12] - 373:24, 381:14, 406:3, 408:17, 410:5, 490:19, 507:11,</p>
--	---	--	---	--

<p>520:3, 560:22, 563:12, 564:9</p> <p>Turbine [14] - 335:8, 335:9, 335:11, 335:17, 335:19, 335:20, 336:24, 337:6, 338:5, 338:7, 339:10, 339:12, 339:15, 340:17</p> <p>turbine [70] - 357:4, 357:5, 357:15, 359:2, 359:3, 359:4, 360:2, 360:5, 362:9, 362:16, 363:3, 363:24, 364:7, 364:23, 366:2, 376:1, 376:22, 376:23, 377:8, 380:24, 380:25, 388:5, 388:7, 390:18, 400:7, 400:11, 400:16, 402:12, 402:15, 403:5, 406:4, 417:9, 427:2, 433:18, 437:9, 444:4, 444:11, 458:1, 462:24, 463:7, 464:21, 471:3, 480:23, 483:1, 484:2, 484:16, 484:19, 489:20, 490:13, 509:5, 511:9, 512:15, 512:17, 512:24, 521:19, 521:21, 524:19, 527:6, 529:7, 533:3, 533:21, 539:2, 555:19, 563:24, 564:4, 575:16, 577:17, 578:13, 578:19, 579:5</p> <p>Turbines [23] - 335:7, 335:13, 335:14, 335:16, 335:16, 335:21, 335:23, 335:23, 335:24, 336:3, 337:8, 337:11, 337:12, 337:15, 337:23, 338:4, 338:5, 338:16, 339:4, 339:6, 339:19, 340:14, 340:15</p> <p>turbines [132] - 357:13, 357:18, 358:5, 359:24, 360:11, 360:24, 364:4, 364:18, 364:21, 365:15,</p>	<p>365:24, 376:15, 378:14, 380:5, 380:16, 381:18, 382:3, 383:6, 384:5, 386:5, 386:24, 388:3, 389:4, 389:12, 389:24, 390:12, 390:25, 391:7, 391:14, 391:19, 391:22, 400:5, 402:5, 402:16, 402:25, 403:4, 403:8, 405:20, 411:11, 412:2, 413:16, 413:20, 423:23, 425:3, 425:11, 425:13, 426:14, 426:17, 426:21, 426:24, 434:2, 434:8, 434:10, 434:23, 435:7, 435:10, 436:19, 436:23, 437:1, 437:5, 438:20, 439:25, 440:13, 440:17, 442:12, 446:22, 448:20, 449:14, 451:23, 452:23, 453:7, 453:13, 453:16, 454:13, 454:16, 454:21, 454:23, 455:4, 455:7, 456:6, 457:12, 457:24, 466:13, 466:21, 467:2, 467:8, 468:8, 469:8, 471:20, 475:6, 477:22, 478:12, 480:5, 486:17, 489:6, 490:3, 490:17, 491:12, 491:13, 491:24, 492:6, 492:14, 500:11, 500:20, 500:21, 501:9, 507:1, 507:3, 512:9, 512:12, 512:19, 514:5, 514:9, 514:13, 519:6, 524:23, 529:10, 531:7, 531:18, 534:6, 539:6, 539:8, 554:9, 554:13, 562:21, 575:19, 576:19, 577:22, 578:6, 578:13, 582:7, 582:13</p> <p>turn [6] - 389:4, 399:2, 487:13, 503:9,</p>	<p>543:1, 584:7</p> <p>turnaround [1] - 583:15</p> <p>turned [2] - 412:2, 413:20</p> <p>turning [4] - 360:1, 400:7, 455:19, 456:22</p> <p>turns [1] - 434:25</p> <p>tweak [1] - 428:2</p> <p>tweaks [1] - 409:10</p> <p>Twain [1] - 526:17</p> <p>two [49] - 342:2, 345:17, 346:2, 358:23, 361:14, 382:15, 382:17, 383:4, 391:14, 403:17, 425:11, 430:6, 430:8, 430:12, 430:20, 433:23, 445:6, 458:2, 458:3, 458:24, 459:1, 464:5, 464:14, 474:2, 474:6, 506:17, 506:20, 508:16, 509:6, 509:19, 510:1, 511:8, 521:19, 525:21, 526:13, 527:8, 531:14, 531:25, 532:14, 534:22, 535:20, 544:17, 549:2, 554:10, 557:6, 557:9, 563:14, 577:19</p> <p>two-mile [3] - 506:17, 506:20, 521:19</p> <p>two-year [3] - 508:16, 511:8, 563:14</p> <p>TYLER [1] - 330:17</p> <p>Tyler [3] - 333:12, 335:5, 338:17</p> <p>type [18] - 399:11, 406:17, 417:2, 421:14, 423:1, 423:2, 424:12, 427:17, 445:2, 484:24, 510:7, 510:19, 511:8, 525:4, 525:6, 530:8, 532:9, 534:22</p> <p>Types [1] - 336:21</p> <p>types [14] - 416:2, 416:5, 417:21, 417:22, 419:5, 445:13, 500:7, 500:12, 501:2, 508:9, 509:6,</p>	<p>524:19, 535:1, 575:17</p> <p>typical [1] - 419:13</p> <p>typically [5] - 387:3, 388:25, 419:5, 514:24, 535:7</p> <hr/> <p style="text-align: center;">U</p> <hr/> <p>U.S [4] - 343:15, 385:1, 437:21, 479:13</p> <p>UK [2] - 336:4, 337:5</p> <p>ultimately [1] - 557:4</p> <p>unaware [1] - 423:5</p> <p>uncertainty [4] - 417:2, 427:25, 431:16, 431:18</p> <p>uncommon [1] - 451:13</p> <p>under [15] - 410:15, 411:18, 412:11, 424:12, 458:1, 460:19, 484:2, 487:6, 499:25, 517:14, 522:25, 539:7, 541:14, 565:25, 582:9</p> <p>Under [1] - 336:3</p> <p>underpredict [1] - 420:4</p> <p>undertake [2] - 557:6, 557:9</p> <p>undertaken [1] - 460:15</p> <p>undisturbed [1] - 524:23</p> <p>unfortunately [2] - 507:13, 523:10</p> <p>unimportant [1] - 491:8</p> <p>unique [2] - 503:1, 503:20</p> <p>United [7] - 415:21, 435:2, 453:5, 453:16, 486:15, 503:1</p> <p>universally [1] - 425:17</p> <p>university [2] - 432:22, 451:3</p> <p>University [6] - 432:23, 432:24, 433:1, 450:23, 485:21, 498:1</p> <p>unless [5] - 388:14, 496:15, 544:22, 551:12, 559:7</p> <p>unlike [1] - 424:16</p> <p>unlikely [1] - 438:17</p>	<p>unmute [1] - 496:17 41</p> <p>unnecessary [3] - 417:8, 417:20, 423:8</p> <p>unzoned [1] - 463:19</p> <p>up [89] - 344:8, 353:15, 370:16, 371:24, 379:19, 380:21, 383:16, 383:17, 394:11, 395:1, 397:8, 406:3, 410:9, 411:9, 414:13, 414:14, 431:12, 435:16, 437:25, 438:14, 438:20, 441:10, 442:12, 446:15, 448:2, 451:10, 453:12, 456:6, 457:8, 459:17, 467:7, 467:12, 471:8, 474:4, 477:2, 478:15, 482:1, 486:23, 487:1, 488:3, 489:20, 490:8, 490:10, 490:16, 491:5, 492:6, 492:15, 493:18, 494:6, 496:12, 503:10, 503:24, 504:7, 505:10, 505:16, 506:25, 513:4, 519:8, 521:12, 522:6, 522:23, 524:14, 525:12, 525:14, 527:17, 527:18, 527:20, 527:24, 527:25, 528:5, 528:24, 529:5, 531:12, 532:8, 532:24, 536:14, 538:19, 542:22, 548:16, 551:13, 565:3, 565:25, 567:6, 571:6, 582:21, 583:3, 583:11</p> <p>Update [1] - 336:4</p> <p>update [2] - 557:5, 559:11</p> <p>Updated [8] - 333:17, 333:18, 333:19, 333:20, 336:16, 338:18, 341:6, 341:7</p> <p>updated [6] - 363:15, 464:9, 550:17, 577:23, 577:24, 577:25</p> <p>updates [3] - 356:3, 356:6, 553:10</p>
--	---	--	--	--

Updates [2] - 334:24, 335:4 upland [5] - 503:21, 504:12, 504:15, 504:17, 509:13 Upper [1] - 507:1 Urban [1] - 337:15 US [5] - 333:21, 333:22, 334:3, 334:5, 340:17 USA [1] - 340:19 useful [3] - 460:16, 510:8, 511:12 user [1] - 419:25 uses [2] - 369:23 UTILITIES [2] - 328:1, 328:11 Utilities [3] - 398:17, 552:16, 568:17 utility [1] - 552:18 utilizing [1] - 412:25	501:22 verbatim [1] - 460:17 verified [1] - 397:3 verify [1] - 427:24 Vermont [2] - 415:18, 451:19 versed [1] - 443:23 version [1] - 434:14 versus [5] - 469:2, 492:2, 492:4, 500:21, 535:22 vetted [1] - 466:25 via [2] - 385:6, 410:13 VICE [1] - 328:12 vice [1] - 465:13 Vicinity [1] - 337:8 vicinity [3] - 435:7, 435:10, 436:19 videos [1] - 455:5 view [9] - 435:14, 438:19, 441:13, 441:24, 444:11, 445:22, 469:24, 517:22, 569:25 views [1] - 471:18 vigorous [1] - 584:11 visitation [1] - 509:18 visiting [1] - 509:13 visual [5] - 434:9, 437:2, 456:16, 457:13, 471:13 Vitae [2] - 337:16, 338:7 vitae [1] - 499:2 vital [1] - 505:1 voice [1] - 517:23 Volume [1] - 328:9 volume [1] - 423:19 voluntary [1] - 511:7 Voluntary [1] - 334:5 votes [2] - 584:21, 584:22	warranty [1] - 368:12 wash [1] - 490:9 watched [2] - 549:22, 567:10 water [1] - 449:6 Water [2] - 336:21, 336:23 waterfowl [3] - 503:3, 503:7, 522:22 Watertown [1] - 461:5 Waverly [3] - 346:6, 347:23, 365:13 ways [1] - 354:19 wearing [1] - 467:3 weather [5] - 360:21, 398:24, 575:20, 577:21, 582:19 Weather [1] - 339:17 website [1] - 347:16 week [4] - 390:5, 393:20, 491:2, 580:23 weekend [1] - 356:16 weeks [3] - 345:17, 346:2, 561:16 weigh [2] - 352:23, 353:6 weight [6] - 351:18, 352:1, 355:1, 423:2, 445:17, 452:16 welcome [6] - 426:7, 430:23, 439:22, 532:22, 548:18, 549:9 welfare [6] - 433:15, 433:19, 455:18, 455:19, 456:1, 457:18 well-being [1] - 444:6 Wells [3] - 333:11, 336:5, 336:10 west [1] - 455:8 wetland [5] - 501:9, 503:5, 503:7, 521:5, 524:10 wetlands [5] - 500:25, 501:7, 501:8, 501:14, 501:16 whatsoever [1] - 442:6 WHO [4] - 340:20, 461:17, 469:13, 470:6 whole [7] - 367:16, 447:16, 488:21, 519:24, 562:1, 564:2, 570:2 Whooping [1] - 333:23 WHOQOL [1] - 337:8	WHOQOL-BREF [1] - 337:8 WI [1] - 339:7 wide [1] - 523:22 widest [2] - 360:8, 400:12 width [2] - 359:4, 360:4 wildlife [18] - 497:7, 497:14, 497:17, 497:19, 498:3, 498:6, 498:9, 500:5, 500:8, 502:24, 507:18, 515:3, 515:6, 519:17, 520:4, 526:1, 528:2, 563:11 Wildlife [5] - 333:21, 333:22, 334:3, 334:5, 497:7 WILHELM [1] - 330:17 Wilhelm [4] - 333:12, 335:5, 338:17, 576:15 willing [5] - 413:22, 448:21, 551:19, 555:18, 562:6 willingness [1] - 584:12 Wind [59] - 328:19, 333:17, 333:18, 333:19, 333:20, 334:4, 335:7, 335:8, 335:9, 335:11, 335:13, 335:14, 335:14, 335:16, 335:16, 335:17, 335:19, 335:19, 335:21, 335:22, 335:23, 335:24, 336:3, 336:24, 337:6, 337:8, 337:10, 337:12, 337:15, 337:23, 338:3, 338:5, 338:5, 338:7, 338:8, 338:12, 338:13, 338:19, 338:22, 339:4, 339:6, 340:11, 340:12, 340:13, 340:14, 340:15, 340:17, 342:4, 342:16, 343:5, 367:2, 415:9, 432:15, 450:11, 450:13, 452:19, 460:25, 511:17, 512:4 wind [153] - 343:4, 343:17, 343:19, 343:23, 343:25, 344:11, 349:24, 353:13, 353:24, 354:6, 354:8, 357:18, 358:4, 359:6, 359:7, 359:24, 359:25, 360:2, 360:6, 360:24, 360:25, 361:19, 362:5, 362:7, 371:13, 379:24, 380:3, 385:14, 385:17, 385:21, 385:22, 386:4, 386:24, 387:17, 389:12, 389:13, 389:21, 389:24, 394:8, 400:4, 400:6, 400:15, 400:16, 406:21, 411:8, 411:12, 411:13, 412:3, 412:11, 415:20, 415:25, 417:9, 421:3, 421:4, 423:23, 425:3, 425:11, 425:13, 426:14, 426:17, 426:20, 429:12, 434:2, 434:7, 434:8, 434:23, 434:25, 435:7, 435:10, 436:19, 436:22, 436:25, 437:5, 438:20, 439:8, 439:15, 439:25, 440:12, 440:17, 442:12, 444:4, 444:11, 446:22, 448:20, 449:14, 451:4, 451:9, 451:17, 451:23, 452:22, 453:7, 453:13, 457:14, 457:16, 459:6, 460:21, 462:24, 463:7, 464:21, 466:3, 466:13, 466:20, 468:8, 469:8, 471:3, 471:19, 473:7, 473:25, 475:6, 477:21, 478:12, 480:5, 480:23, 481:21, 483:1, 484:2, 486:17, 490:13, 498:5, 507:1, 507:2, 510:6, 510:11, 510:16, 510:21, 511:5, 512:8, 514:5, 514:8,	
V				
vacillating [1] - 348:21 vacillation [1] - 348:24 Valbridge [1] - 337:14 valiant [1] - 549:18 valid [5] - 411:10, 412:8, 413:6, 413:9, 534:4 validity [1] - 515:8 Valley [1] - 339:16 valuable [3] - 389:2, 510:12, 510:14 value [5] - 390:20, 475:10, 475:24, 510:18, 537:5 Value [3] - 333:9, 337:14, 337:15 Variables [1] - 335:19 variance [1] - 429:4 variances [1] - 429:5 variation [1] - 419:11 variations [1] - 420:15 varies [1] - 532:1 variety [1] - 416:25 Various [1] - 336:3 various [10] - 436:9, 436:14, 456:8, 488:2, 506:2, 520:1, 520:2, 524:19, 528:8, 535:1 vary [2] - 507:24 varying [2] - 513:3, 514:13 vast [1] - 473:3 vegetation [2] - 500:5,				
W				
waiting [1] - 542:4 waive [1] - 567:1 waiver [2] - 361:16, 565:11 wakefulness [1] - 486:12 waking [2] - 490:15, 491:5 walk [2] - 562:16, 566:15 walked [2] - 576:15, 576:16 wandering [1] - 526:19 warranted [1] - 480:2				

<p>514:9, 518:22, 519:6, 519:14, 519:20, 522:5, 523:4, 524:7, 527:12, 548:2, 549:2, 551:11, 552:21, 554:9, 554:13, 554:21, 555:19, 561:25, 562:21, 571:11, 572:10, 572:23 WIND [2] - 328:4, 328:5 Wind's [1] - 339:17 window [4] - 359:16, 359:20, 484:23, 517:20 windows [1] - 442:14 WindPRO [4] - 343:21, 343:25, 419:16, 419:20 Windy [1] - 337:15 windy [1] - 388:10 Wisconsin [4] - 339:3, 339:5, 340:10, 340:11 wish [1] - 522:18 withstanding [1] - 374:18 Witness [1] - 382:5 witness [59] - 342:17, 349:3, 349:18, 349:23, 350:4, 350:10, 350:13, 350:14, 350:15, 351:11, 351:19, 352:17, 353:1, 368:3, 370:21, 372:11, 375:5, 381:2, 381:24, 383:1, 384:11, 384:13, 404:5, 408:1, 414:8, 414:20, 418:2, 432:4, 432:5, 433:22, 435:19, 449:23, 449:25, 458:9, 458:23, 459:1, 459:5, 459:10, 459:11, 459:12, 459:21, 460:18, 468:1, 482:12, 494:2, 494:8, 494:25, 511:20, 540:18, 543:22, 544:1, 546:11, 546:18, 552:6, 552:8, 557:13, 574:11, 574:12, 579:20</p>	<p>WITNESS [205] - 330:2, 345:1, 345:3, 345:7, 345:10, 345:16, 346:2, 346:8, 346:10, 347:1, 347:11, 347:15, 347:25, 348:4, 348:9, 353:11, 353:25, 354:3, 366:18, 366:22, 366:25, 367:5, 367:11, 367:14, 367:18, 367:21, 368:8, 368:14, 368:18, 368:25, 369:5, 369:10, 369:14, 384:22, 385:11, 385:16, 385:18, 386:16, 387:3, 387:24, 388:2, 388:23, 389:6, 389:20, 390:3, 390:10, 390:18, 390:23, 391:9, 391:20, 391:23, 392:6, 392:10, 392:16, 392:21, 393:3, 393:12, 393:20, 394:20, 394:25, 395:18, 395:23, 396:1, 396:4, 396:8, 396:11, 396:14, 396:19, 396:23, 397:3, 397:13, 397:17, 398:6, 398:13, 398:22, 399:15, 399:18, 399:25, 400:2, 400:10, 400:23, 401:1, 401:4, 401:10, 402:20, 404:9, 407:12, 407:22, 411:7, 413:2, 413:18, 414:5, 414:19, 422:4, 422:10, 422:12, 422:16, 422:20, 423:13, 423:16, 423:21, 424:1, 424:5, 424:11, 424:25, 425:19, 426:4, 426:7, 426:18, 427:15, 428:9, 428:15, 428:19, 429:6, 430:6, 430:9, 430:14, 430:16, 430:23, 432:3, 439:6, 439:10,</p>	<p>439:17, 439:21, 439:23, 440:1, 440:4, 440:14, 441:12, 442:19, 443:2, 443:7, 443:18, 444:3, 445:22, 446:13, 446:25, 449:21, 485:14, 485:19, 486:1, 487:5, 487:12, 491:1, 491:9, 491:21, 492:11, 493:13, 493:25, 518:1, 518:13, 518:18, 519:21, 520:20, 522:16, 523:25, 525:10, 526:10, 526:15, 526:20, 527:10, 528:21, 529:2, 529:15, 530:4, 530:11, 530:16, 531:11, 532:22, 533:6, 534:10, 534:20, 536:24, 537:7, 540:14, 548:18, 548:25, 549:6, 549:10, 549:17, 549:20, 549:23, 550:10, 551:22, 552:5, 561:1, 562:23, 563:19, 564:18, 565:2, 565:19, 565:22, 566:23, 567:11, 567:17, 567:24, 568:1, 568:7, 568:24, 569:5, 569:8, 569:11, 569:25, 571:3, 571:17 witnesses [6] - 494:11, 494:17, 496:12, 575:1, 579:18, 583:7 WITNESSES [3] - 330:7, 331:2, 332:2 WITTLER [1] - 585:5 Wittler [3] - 328:24, 585:17, 585:18 woken [4] - 489:20, 490:8, 490:10, 492:1 Women's [1] - 432:13 wondering [2] - 392:21, 526:18 word [6] - 444:5, 473:11, 481:13, 482:6, 523:19, 569:20</p>	<p>words [6] - 346:20, 364:13, 372:6, 473:18, 475:23, 577:5 workable [2] - 420:19, 420:23 world [6] - 437:24, 453:3, 453:17, 456:10, 490:25, 513:18 World [6] - 438:12, 461:17, 467:15, 467:18, 469:5, 475:22 world's [1] - 343:22 worldwide [2] - 434:15, 438:3 worry [1] - 445:20 worst [3] - 399:5, 428:24, 428:25 worst-case [2] - 399:5, 428:24 worth [2] - 509:24, 510:4 wrestling [1] - 565:22 write [1] - 383:8 writings [5] - 470:1, 473:13, 473:16, 474:13, 474:22 written [11] - 374:10, 374:19, 422:10, 422:24, 437:15, 459:11, 459:12, 463:3, 463:11, 474:5, 554:25 wrote [1] - 553:7 WTN [2] - 486:23, 487:1</p>	<p>347:16, 348:11, 43 351:13, 353:13, 353:17, 353:18, 373:5, 419:2, 427:9, 428:13, 428:14, 428:18, 428:22, 428:25, 430:4, 444:9, 444:10, 445:7, 445:23, 451:1, 451:5, 452:18, 454:7, 454:11, 474:2, 477:10, 480:9, 489:5, 492:18, 497:13, 499:18, 499:19, 504:16, 507:11, 509:6, 525:21, 527:11, 531:14, 549:3, 557:6, 557:9, 563:6 yellow [3] - 506:6, 546:20, 546:21 yesterday [4] - 363:25, 365:3, 534:14, 576:25 yields [1] - 385:15 York [1] - 468:24 yourself [4] - 345:13, 346:6, 372:25, 422:8</p>
Z				
<p>zero [2] - 361:1, 458:5 zoning [3] - 450:14, 461:14, 473:7</p>				