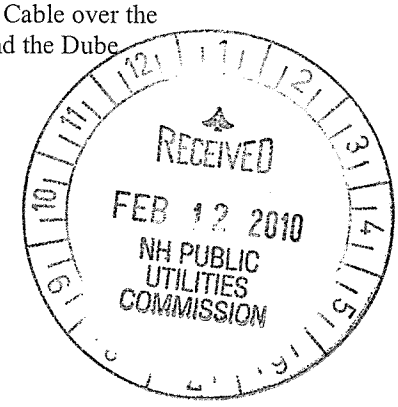
STATE OF NEW HAMPSHIRE

Inter-Department Communication

DATE: February 11, 2010
AT (OFFICE): NHPUC

FROM: Tom Frantz – Director, Electric Division

SUBJECT: DE 09-277: Petition by Public Service Company of New Hampshire for a License to Construct and Maintain Electric Lines, a Static Wire, and/or a Fiber Optic Communications Cable over the Bean River, North River, and Little River in Nottingham, the Oyster River in Barrington, and the Dube Brook and the Oyster River in Lee, New Hampshire



TO: Chairman Getz, Commissioners Below and Ignatius
Executive Director Howland

On December 23, 2009, Public Service Company of New Hampshire (PSNH) filed a petition with the New Hampshire Public Utilities Commission (Commission) pursuant to RSA 371:17 for a license to construct and maintain electric lines, a static wire, and/or a fiber optic communications cable (OPGW) at six locations for the purpose of rebuilding a 115 kilovolt (kV) line between its Deerfield Substation in Deerfield, New Hampshire and its Madbury Substation in Madbury, New Hampshire (depicted as line L-175) to increase its capacity upon the installation of the second 345/115 kV autotransformer at the Deerfield Substation in Deerfield, NH. On January 08, 2010, PSNH updated its Plan and Profile Drawings filed as Exhibits 4 and 6 in the December 23 filing to more accurately depict the crossings at the 100 year flood level.

PSNH states that the new crossings are required to commence construction by March 1, 2010 to accommodate the December 2012 in service date of the new autotransformer. The L-175 115 kV transmission line is an integral part of the PSNH transmission system and the New England transmission grid. The rebuild of the L-175 115kV line and the six new crossings will allow PSNH to meet the reasonable requirements of service to the public and to provide reliable electric service to customers in this area of New Hampshire. The petition requests licenses for all 6 crossings as the existing 6 crossings are not currently licensed.

PSNH states that the new crossings will be operated at a voltage of 115 kV and that the structures of all crossings are located within existing easements. PSNH also states that two of the crossings, Appendices B and C in the petition (North and Little Rivers in Nottingham respectively); require permits from the New Hampshire Department of Environmental Services as they are in jurisdictional wetlands. PSNH based its minimum clearance requirements on a 100-year flood elevation which exceeds the 10-year requirement of the National Electrical safety Code (NESC).

Staff employed a consultant, Michael D. Cannata, to review PSNH's petition. On January 18, 2010, Mr. Cannata filed an electronic memo of its review of PSNH's petition with Staff. The memo stated that "...PSNH has provided sufficient information and data to justify construction of new electric lines, a static wire, and/or a communications cable across public waters at these locations" and that "...PSNH assures the Commission that the new overhead facilities will be properly constructed, operated, and maintained in accordance with the requirements of the NESC, ANSI C2-2007." Mr. Cannata concluded that "...if the

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- Require that PSNH shall conform to all requirements of the New Hampshire Department of Environmental Services related to these approved crossings

- Require that PSNH file copies of all required New Hampshire Department of Environmental Services wetland permits required for these crossings with the Commission when received

- Require that all future reconstruction to these approved crossings shall conform to the requirements of the National Electrical Safety Code and all other applicable safety standards in existence at that time

- Require that PSNH maintains and operates these crossings in conformance with the National Electrical Safety Code.

Based upon Staff's review of the filing and the recommendation of the consultant, Staff recommends that the Commission approve the PSNH petition with the conditions stated above by order nisi for effect on or before March 1, 2010. The report of the consultant is attached for your review.

Please contact me if you have any questions or would like to discuss this matter.

DE 09-277

Accion Group Review of the Public Service Company of New Hampshire Petition for License to Construct and Maintain Electric Lines, a static Wire, and/or a Fiber Optic Communications Cable Over and Across the Public Waters of the Bean River, North River, and Little River in Nottingham, the Oyster River in Barrington, and the Dube Brook and Oyster River in Lee

January 18, 2010

Review Summary

On December 23, 2009, Public Service Company of New Hampshire (PSNH) filed a petition with the New Hampshire Public Utilities Commission (Commission) pursuant to RSA 371:17 for a license to construct and maintain electric lines, a static wire, and/or a fiber optic communications cable (OPGW) at six locations for the purpose of rebuilding a 115 kilovolt (kV) line between its Deerfield Substation in Deerfield, New Hampshire and its Madbury Substation in Madbury, New Hampshire (depicted as line L-175) to increase its capacity upon the installation of the second 345/115 kV autotransformer at the Deerfield Substation in Deerfield, NH. The transformer installation causes overloads of the existing facilities coupled with load growth in the seacoast area of New Hampshire. PSNH states that the new crossings are required to commence construction by March 1, 2010 to accommodate the December 2012 in service date of the new autotransformer. The L-175 115 kV transmission line is an integral part of the PSNH transmission system and the New England transmission grid. The rebuild of the L-175 115kV line and the six new crossings will allow PSNH to meet the reasonable requirements of service to the public and to provide reliable electric service to customers in this area of New Hampshire.

In support of its petition, PSNH submitted related figures, tables, and exhibits as follows: construction detail drawing depicting the construction specifications of the proposed single wood pole tangent structures (Figure 1), construction detail drawing depicting the construction specifications of the proposed H frame tangent structures (Figure 2), a table which correlates crossing locations, waters crossed, previous Commission approval Order Numbers and Docket Numbers for these crossing locations, and current petition crossing identification (Table 1), appendices describing the design conditions of the six proposed crossings (Appendices, A, B, C, D, E, and F), geographic maps depicting the locations of the six proposed crossings (Exhibits 1, 3, 5, 7, 9, and 11 respectively), plan and profile drawings depicting the locations and projected elevations of the six proposed crossings (Exhibits 2, 4, 6, 8, 10, and 12 respectively). Table 1, the related exhibit identification for the current petition, and previous crossing licence information is shown in Attachment A to this report. Due to either oversight or the application of navigability or other crossing licence criteria, none of these crossings were licensed at the time of original construction. PSNH filed additional information requested by the Accion Group (Accion) on January 8, 2010.

PSNH states that it owns easements that are a minimum of 295 feet in width for its lines and facilities on both sides of the public water bodies at all of the proposed crossing locations and that each of the crossings will be constructed within the limits of those easements. The new crossings will be constructed at locations described in Attachment B to this report.

The construction of the crossings will consist of either single pole laminated wood tangent structures (Type WT1) depicted in Figure 1, or two pole laminated wood H frame tangent structures (Type RAX) shown in Figure 2. All structures will be constructed to National Electrical Safety Code (NESC) Grade B construction requirements. As designed by PSNH and depicted in Figure 1, the single pole tangent structures will be davit arm construction. The phase conductors will be vertically configured and offset resulting with the highest and lowest conductors on one side of the pole and the middle conductor on the other. The highest conductor will be 15 feet 0-inches from the top of the pole and 6-feet 0-inches offset from the pole. The lowest conductor will be 15-feet 0-inches below the highest conductor and 7-feet 0-inches offset from the pole. On the other side of the pole, the middle conductor will be 22-feet 0-inches from the top of the pole and 6-feet 0-inches offset from the pole. The optical ground wire (OPGW) communications cable will be mounted on the pole 6-inches from the top of the pole and on the same side as the highest conductor. As designed by PSNH and as depicted in Figure 2, the two poles of the tangent structures will be double X braced and the conductors will be horizontally spaced 14-foot 0-inches apart with each of the phase conductors on a cross arm 12-foot 6-inches from the top of the poles. The static wire and the OPGW communications cable will be mounted on each pole 9-inches down from the top of the pole. The structure number, structure type and height, crossing span length, and geographic placement relative to the crossing are shown in Attachment C to this report.

PSNH investigated a multitude of weather and loading conditions for its design. The conditions investigated were the NESC American National Standards Institute (ANSI) C2-2007 Heavy Load Conditions (0 degrees F, 4 pounds per square foot wind loading, and ½ inch radial ice), minus 20 degrees F ambient temperature, and 285 degrees F conductor temperature. PSNH used these design conditions to determine the minimum clearance of the conductors to the water surfaces of the crossings and to land surfaces. To determine the minimum distances between the phase conductors and the static wire conductor and the OPGW communication cable, PSNH assumed the phase conductors were at 30 degrees F with no ice while the static wire and the fiber optic conductors above were at 30 degrees F and an extreme ice loading of one inch radial ice.

The three phase conductors will be 1590 MCM 45/7 ACSR conductors, constructed in either a vertical or horizontal configuration as described above. The static wire, where used, will be a single 19 #10 Alumoweld conductor and will be bracket mounted on the poles. The OPGW communication cable is a 24 fiber optic strand cable and will be bracket mounted on the structures and poles in the same manner as the static wire. The phase conductors will be tensioned to 10,000 pounds and the static wire and OPGW communication cable will be tensioned to 4,500 pounds. All conductors, static wires, and OPGW communication cables will be sagged to NESC, ANSI C2-2007 Heavy Load

Conditions at the above tensions.

PSNH used the 100-year flood levels contained in the Federal Emergency Management Agency (FEMA) flood insurance rate maps at all locations in its design. PSNH stated that it used the 100-year flood for water elevations as the normal flood level or 10-year flood levels required by the NESC were not available and that the 100-year flood level will be well above the 10-year flood elevation.

PSNH further states that the maximum sag for the phase conductors occurs when they are at their maximum operating temperature of 285 degrees F. Water surface areas, whose size determines NESC minimum clearance requirements were calculated according to NESC Table 232-1, Note 19, using the largest surface area of a one mile section of the water body in either direction. The resultant water surface areas ranged from 18 acres to 52 acres. For waters suitable for sail boating, Table 232-1 requires a minimum water surface clearance of 22.1 feet for water surface areas of less than 20 acres and 30.1 feet for water surface areas of 20 acres to 200 acres when adjusted by NESC Rule 232.C.1.a. for circuits operating at 115kV. For waters not suitable for sail boating (Appendices B and C), 18.6 feet of clearance is required when adjusted by NESC Rule 232.C.1.a. for circuits operating at 115kV.

For static wires and OPGW communication cables that meet Rule 230C1, the minimum clearance required by Table 232-1 to the water surface is 17.5 feet for water surface areas of less than 20 acres and 25.5 feet for water surface areas of 20 acres to 200 acres. For waters not suitable for sail boating (Appendices B and C), 14.0 feet of clearance is required. The maximum sag of the static wire and the OPGW communication cable will never exceed these clearance requirements as they are located well above and offset from the phase conductors and will never sag to levels near the phase conductors. The 100-year flood elevations, calculated water surface areas, water surface clearance requirements, and minimum water surface clearance for the phase conductors are shown in Attachment D to this report.

For phase conductors adjusted to a 115kV operating voltage by NESC Rule 232.C.1.a, the minimum clearance required by Table 232-1 to the land surface where truck traffic is present is 20.1 feet. For static wires and OPGW communication cables that meet Rule 230C1, the minimum clearance required by Table 232-1 to the land surface is 15.5 feet. The maximum sag of the static wire and the OPGW communication cable will never exceed these clearance requirements as they are located well above and offset from the phase conductors and will never sag to levels near the phase conductors. The land surface clearance requirements, and minimum land surface clearance for the phase conductors are shown in Attachment E to this report.

PSNH determined that the minimum distance between the static wire or the OPGW fiber optic cable and the phase conductors occurs when the phase conductors are at a temperature of 30 degrees F and have no ice while the static wire or OPGW fiber optic cable is at 30 degrees F with an extreme ice loading of 1 inch radial ice. NESC Table 235-6, Section 2a requires that the minimum distance between the phase conductors and

the static wire or OPGW fiber optic cable be 54.3 inches or 4.8 feet for circuits operating at 115kV when adjusted by NESC Rule 235C.2.a.1. The minimum expected vertical and horizontal clearances between the phase conductors and the static wire or the OPGW communication cable are depicted in Attachment F to this report.

PSNH states that the portion of the North River crossed in Appendix B and the portion of the Little River crossed in Appendix C are not suitable for sail boating. On January 15, 2010, Accion performed a site visit and took photographs of the crossings in Appendices B and C which PSNH claims to not be suitable for sail boating. Photographs of the crossings in Appendices B and C appear as Attachment G to this report. Accion concluded that the PSNH assessment was correct and is described directly below.

PSNH states that the portion of the North River crossed in Appendix B is not suitable for sail boating because the river is impounded to the South by a box culvert at NH Route 152 at an elevation of 240 feet to the top of the culvert. With a 100-year flood elevation of 240 feet, no vessel would be able to pass through the culvert. Photo #3 shows the water level which is approximately 5 feet below the top of the culvert and that at the flood design level, sail boats could not traverse the brush to the proposed crossing. To the north and east of the crossing, the North River splits and is culverted at Freeman Hall Road and Priest Road. At Freeman Hall Road, the top of the culvert is at an elevation of 299 feet, well above the 240 foot 100-year flood elevation. At this elevation, FEMA states that the river would not flow outside of its banks and would have a depth of 1 foot during the 100-year event. Photo #1 shows that wooded terrain at this location prevents access at the flood design level. At Priest Road, the top of the culvert elevation is 244 feet, again restricting passage during a 100-year event of an elevation of 240 feet. Photo #2 shows that there is no reasonable access at this location even at the flood design level. Additionally, PSNH states that there are no other access roads or boat ramps to launch a sailboat. The Accion site visit found no further point of access to the proposed crossing.

PSNH states that the portion of the Little River crossed in Appendix C is not suitable for sail boating because the river is impounded to the South by a box culvert at Kennard Road at an elevation of 178 feet to the top of the culvert. With a 100-year flood elevation of 187 feet, no vessel would be able to pass through the culvert and the road would be under water. Photo #4 shows that there is no reasonable access at this location because of vegetation, even at the flood design level. To the north of the crossing, the river is culverted at NH Route 4 with a culvert at an elevation of 197 feet to the top of the culvert. The water level observed during the Accion site visit approximates the flood level design. Photos #5 and #6 show that although access might be gained at this location, extreme vegetation prevents access to the proposed crossing. Additionally, PSNH states that there are no other access roads or boat ramps to launch a sailboat. The Accion sit visit found no further point of access to the proposed crossing.

PSNH states that the water crossings depicted in Appendices B and C will be set within jurisdictional wetlands or other areas that will require New Hampshire Department of Environmental Services (NHDES) permitting. PSNH further states that the appropriate NHDES wetlands permits have been applied for and will be obtained by PSNH prior to

the installation of any of the new structures associated with the crossings at these locations.

PSNH states that the use and enjoyment by the public of these waters will not be diminished in any material respect as a result of the proposed electric, static wire, and communication line crossings. PSNH further attests that the construction of the crossing will be constructed, maintained, and operated in accordance with the requirements of the National Electrical Safety Code, ANSI C2-2007.

Conclusions and Recommendations

Accion reviewed the petition and associated technical information filed by PSNH in support of its petition.

Accion found that PSNH has provided sufficient information and data to justify construction of new electric lines, a static wire, and/or a communications cable across public waters at these locations.

Accion found that PSNH assures the Commission that the new overhead facilities will be properly constructed, operated, and maintained in accordance with the requirements of the NESC, ANSI C2-2007.

Accion concluded that if the proposed facilities are constructed, operated, and maintained as proposed in its filing, PSNH will provide safe and reliable service to the public based on sound engineering standards and that construction will be in accordance with the 2007 edition of the National Electrical Safety Code.

Accion recommends that Staff recommend approval of PSNH's petition to the Commission.

Accion further recommends that Staff recommend that the Commission include the following conditions on PSNH in its order.

- Require that PSNH shall conform to all requirements of the New Hampshire Department of Environmental Services related to these approved crossings

- Require that PSNH file copies of all required New Hampshire Department of Environmental Services wetland permits required for these crossings with the Commission when received

- Require that all future reconstruction to these approved crossings shall conform to the requirements of the National Electrical Safety Code and all other applicable safety standards in existence at that time

- Require that PSNH maintains and operates these crossings in conformance with the National Electrical Safety Code.

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Accion Report – January 18, 2010 – Attachment A

Correlation of Existing and Current Petition Information

Town	Water Body	Former NHPUC Order No.	Former NHPUC Docket No.	Current Petition Appendix #	Current Petition Location Exhibit #	Current Petition Plan & Profile Exhibit #
Nottingham	Bean River	N/A[1]	N/A[1]	A	1	2
	North River	N/A[1]	N/A[1]	B[2]	3	4
	Little River	N/A[1]	N/A[1]	C[2]	5	6
Barrington	Oyster River	N/A[1]	N/A[1]	D	7	8
Lee	Dube Brook	N/A[1]	N/A[1]	E	9	10
	Oyster River	N/A[1]	N/A[1]	F	11	12

1 – These crossings were not previously licensed.
These crossings will be constructed in jurisdictional wetlands.

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Accion Report – January 18, 2010 – Attachment B

Location Descriptions of Crossings

Current Petition Appendix #	Town	Water Body	Current Petition Location Ex. #	Location Description
A	**Nottingham**	Bean River	1	0.4 miles North of Quincy Pond and 0.25 miles East of Bean Hill Road
B		North River	3	0.15 miles East of NH Route 152 and 0.25 miles West of Priest Road
C		Little River	5	0.5 miles West of US Route 4 and 0.15 miles North of Kennard Road
D	**Barrington**	Oyster River	7	1.05 miles West of NH Route 25 and 0.4 miles North of US Route 4
E	**Lee**	Dube Brook	9	0.4 miles East of Sheep Road and 0.15 miles West of Snell Road
F		Oyster River	11	At NH Route 155

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Accion Report – January 18, 2010 – Attachment C

Structure and Span Information

Current Petition Appendix #	Town	Water Body	Current Petition Plan & Profile Exhibit #	Structure # & Location	Structure Type & Height (feet)	Span Length (feet)
A	**Nottingham**	Bean River	2	#19 – West #20 – East	WT1-85H3 WT1-85H3	593
B		North River	4	#42 – West #43 - East #43 – West #44 - East #44 – West #45 – East #45 – West #46 - East	WT1-100H3 WT1-95H3 WT1-95H3 WT1-95H3 WT1-95H3 WT1-95H3 WT1-95H3 WT1-100H3	566 526 570 560
C		Little River	6	#66 – West #67 – East #67 - West #68 – East	WT1-95H3 WT1-90H3 WT1-90H3 WT1-90H3	493 524
D	**Barrington**	Oyster River	8	#90 – West #91 - East	WT1-90H3 WT1-95H3	497
E	**Lee**	Dube Brook	10	#113 – West #114 – East	WT1-80H3 RAX-90	683
F		Oyster River	12	#125 – West #126 - East	WT1-90H3 WT1-100H3	624

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Accion Report – January 18, 2010 – Attachment D

Phase Wire Water Clearance Information[1]

Current Petition Appendix #	Town	Water Body	Current Petition Plan & Profile Ex. #	Structure # & Location	100 Year FEMA Flood Elevation (feet)[2]	Water Acreage (acres)	Phase Wire Water Clearance Required (feet)	Minimum Water Clearance (feet)
A	**Nottingham**	Bean River	2	#19 – West #20 – East	269	52.1	30.1	33.8
B		North River	4	#42 – West #43 - East	240	N/A[2]	18.6	28.5
				#43 – West #44 - East	240	N/A[2]	18.6	26.8
				#44 – West #45 – East	240	N/A[2]	18.6	26.8
				#45 – West #46 – East	240	N/A[2]	18.6	36.1
C		Little River	6	#66 – West #67 – East	187	N/A[2]	18.6	33.2
				#67 - West #68 – East	187	N/A[2]	18.6	26.3
D	**Barrington**	Oyster River	8	#90 – West #91 – East	191	26.7	30.1	39.0
E	**Lee**	Dube Brook	10	#113 – West #114 – East	105	37.6	30.1	39.9
F		Oyster River	12	#125 – West #126 – East	79	18.2	22.1	38.9

1 - Static wire and OPGW cable clearance requirements are not shown. Clearance requirements for the static wire and the OPGW cable to the water surface are always less than the phase wire under these conditions. The static wire and OPGW cable are installed well above the phase wires and will never sag within the minimum separation requirements of the phase conductors.
2 – These structures span waters not suitable for sail boating.

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Accion Report – January 18, 2010 – Attachment D

Phase Wire Water Clearance Information[1]

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Accion Report – January 18, 2010 – Attachment E

Phase Wire Land Clearance Information[1]

Current Petition Appendix #	Town	Water Body	Current Petition Plan & Profile Ex. #	Structure # & Location	Phase Wire Land Clearance Required (feet)	Minimum Land Clearance (feet)
A	**Nottingham**	Bean River	2	#19 – West #20 – East	20.1	42.9
B		North River	4	#42 – West #43 - East	20.1	33.8[2]
				#43 – West #44 - East	20.1	33.8[2]
				#44 – West #45 – East	20.1	31.9[2]
				#45 – West #46 - East	20.1	22.4
C		Little River	6	#66 – West #67 – East	20.1	37.4[2]
				#67 - West #68 – East	20.1	30.4[2]
D	**Barrington**	Oyster River	8	#90 – West #91 - East	20.1	35.6
E	**Lee**	Dube Brook	10	#113 – West #114 – East	20.1	36.3
F		Oyster River	12	#125 – West #126 - East	20.1	30.1

1 - Static wire and OPGW cable clearance requirements are not shown. Clearance requirements for the static wire and the OPGW cable to the land surface are always less than the phase wire under these conditions. The static wire and OPGW cable are installed well above the phase wires and will never sag within the minimum separation requirements of the phase conductors.
2 – Least clearance to land at these locations is below the design flood level.

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Accion Report – January 18, 2010 – Attachment E

Phase Wire Land Clearance Information[1]

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Accion Report – January 18, 2010 – Attachment F

Minimum Clearance Between Phase and Neutral Conductors

Current Petition Appendix #	Town	Water Body	Current Petition Plan & Profile Ex. #	Structure # & Location	Minimum Clearance Required (feet)	Vertical Clearance (feet)[1]	Horizontal Clearance (feet)[1]
A	**Nottingham**	Bean River	2	#19 – West #20 – East	4.8	9.8	6.0
B		North River	4	#42 – West #43 - East	4.8	10.2	6.0
				#43 – West #44 - East	4.8	10.8	6.0
				#44 – West #45 – East	4.8	13.1	6.0
				#45 – West #46 - East	4.8	10.3	6.0
C		Little River	6	#66 – West #67 – East	4.8	11.2	6.0
				#67 - West #68 – East	4.8	10.7	6.0
D	**Barrington**	Oyster River	8	#90 – West #91 - East	4.8	11.1	6.0
E	**Lee**	Dube Brook	10	#113 – West #114 – East	4.8	7.5	7.0
F		Oyster River	12	#125 – West #126 - East	4.8	9.0	6.0

1 – The actual clearance will always be greater or equal to either the vertical or horizontal distances.

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Accion Report – January 18, 2010 – Attachment G

Photographs of Appendices B and C

Waters Not Suitable for Sail Boating

Photo #1 - Appendix B – Freeman Hill Road

Photo #2 – Appendix B – Priest Road

Photo #3 – Appendix B – NH Route 152

Photo #4 – Appendix C – Kennard Road

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Photo #5 – Appendix C – NH Route #4 (#1)

Photo #6 – Appendix C – NH Route #4 (#2)

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Accion Report – January 18, 2010 – Attachment G

Photographs of Appendices B and C

Waters Not Suitable for Sail Boating