STATE OF VERMONT
PUBLIC SERVICE BOARD

Petition of Entergy Nuclear Vermont Yankee, LLC, and Entergy Nuclear Operations, Inc., For a Certificate of Public Good Pursuant to 30 V.S.A. § 248 and 10 V.S.A. § 6522 to Construct a Second Independent Spent Fuel Storage Installation ("ISFSI") at the Vermont Yankee Nuclear Power Station	)	Docket No. 8300

PREFILED TESTIMONY OF ROB EVANS

On Behalf of the Vermont Agency of Natural Resources, Department of Environmental Conservation, River Corridor and Floodplain Protection Program

Summary of Testimony

Mr. Evans is the State Floodplain Manager and provides an overview of the potential impacts of the Project on river corridors and flood hazard areas and outlines the steps required to comply with the Flood Hazard Area and River Corridor Rule and Criterion 1D - Floodways.

Q1. Please state your name, place of employment, and position.

A1. My name is Rob Evans. I am the State Floodplain Manager and supervise the River Corridor and Floodplain Protection Program within the Watershed Management Division of the Vermont Department of Environmental Conservation.

Q2. Please describe your educational and professional background and tenure at the Agency of Natural Resources.

A2. I have been employed as the State Floodplain Manager for six and half years. As a primary liaison to FEMA Region 1, I serve as the National Flood Insurance Program Coordinator for the State, responsible for providing technical assistance and regulatory support on floodplain management, flood hazard mapping, flood insurance, and flood hazard mitigation. I supervise a staff of regional floodplain managers and river scientists that support state and local regulation and protection of floodplains and river corridors. The program floodplain managers review projects and issue permit decisions for compliance with the Flood Hazard Area and River Corridor Rule (Environmental Protection Rule, Chapter 29). Program floodplain managers and scientists also review and comment on projects subject to Act 250 and Section 248 that have the potential to impact Criterion 1D-Floodways as defined by the Secretary of Natural Resources. In addition, our section provides technical assistance, education, and outreach on river corridor and flood resilience planning; floodplain and river corridor assessment and mapping; and river and floodplain restoration/protection projects.

Prior to working for the Agency of Natural Resources, I worked for the State of Wyoming Department of Environmental Quality as a project manager and district surface water hydrologist.

My resume is attached as **Exhibit ANR-REE-1**.

Q3. While at the Agency, have you engaged in any training or classes related to your work with floodplains and river corridors?

A3. Yes, I have taken a myriad of workshops and trainings related to the floodplain management discipline. In order to maintain my Certified Floodplain Manager accreditation, I must take a minimum of 16 continuing education credits every two years.

Q4. Have you previously provided testimony to the Public Service Board, the Environmental Court, or the District Commissions?

A4. I have provided direct testimony on the New England Clean Power Link project and have reviewed testimony provided by program technical staff under my supervision.

Q5. What is the purpose of your testimony?

A5. The purpose of my testimony is to give the Agency's overall perspective on the Project as it relates to the Flood Hazard Area and River Corridor permit requirements (hereafter, state floodplain permit) and Criterion 1D – Floodways, and whether the Project meets the Flood Hazard Area and River Corridor Rule and Criterion 1D.

Q6. Will the Project require a state floodplain permit pursuant to the state Flood Hazard Area and River Corridor Rule?

A6. Yes, the project will require a state floodplain permit under the Flood Hazard Area and River Corridor Rule. The proposed dry cask storage pad is regulated under Section 248 and is located within the river corridor of the Connecticut River. Therefore, under the Rule, the Project is "development exempt from municipal regulation" requiring a state floodplain permit.

Q7. What is a river corridor?

A7. A river corridor defines the lateral space necessary for a river or stream to establish or maintain a meander geometry that is vertically stable and least erosive, and defines the area where fluvial erosion is most likely to occur as a river adjusts over time. Fluvial erosion hazards can result from the erosion or scouring of riverbeds and banks during high flow conditions of a river. Fluvial erosion becomes a hazard when life, property, or infrastructure is placed in close proximity to a river or stream. The Agency identifies and maps river corridors statewide. River corridors are regulated under the Flood Hazard Area and River Corridor Rule. Since 2003, the Agency uses the river corridor to determine the Act 250 Floodway under Criterion 1D in consideration of flood-related erosion hazards. As part of the Section 248 process, the Agency makes determinations and recommendations under Criterion 1D-Floodways utilizing the Agency-mapped river corridor.

Q8. Has the Agency created a river corridor map for the Connecticut River?

A8. In January 2015, the agency published a statewide river corridor map on the web-based ANR Natural Resources Atlas. However, during the initial development of the statewide river corridor map, the Agency recognized that the Connecticut River flows in a unique geologic and geographic setting and is influenced by numerous impoundments. In order to create an appropriate river corridor for the Vermont side of the Connecticut River, the Rivers Program is in the process of conducting a separate analysis to review the influence of features such as escarpments and impoundments that affect fluvial processes, valley bottom lands, floodplains, river planform, and corridor widths. In the interim, the Agency will continue to make site specific river corridor maps and floodway determinations to inform regulatory compliance in river corridors, which has been standard practice for over a decade. The Vermont Supreme Court affirmed the Secretary's authority to make floodway determinations, without adopting an administrative rule, based on the plain language of the statute, which authorizes the Secretary to make such determinations (In re Woodford Packers, Inc., 2003 VT 60, ¶ 12-13, 175 Vt. 579, 830 A.2d 100).

Q9. Has the Agency created a river corridor map for the project site in Vernon and is the project within the river corridor?

A9. Yes, a river corridor map has been created for the site and is attached as **Exhibit ANR-REE-2**. The proposed dry cask storage pad is within the river corridor.

Q10. What is a flood hazard area?

A10. A flood hazard area defines the area that would be inundated by the 1% annual chance flood (i.e. the 100-year flood). Flood Insurance Rate Maps and Flood Insurance Studies published by the Federal Emergency Management Agency (FEMA) designate the flood hazard area and are the basis of the National Flood Insurance Program (NFIP). The flood hazard area is regulated under the Flood Hazard Area and River Corridor Rule to ensure the state's compliance with the NFIP. The Agency uses the FEMA-designated flood hazard area to determine the Act 250 Floodway in consideration of flood inundation hazards. As part of the Section 248 process, the Agency makes determinations and recommendations under Criterion 1D-Floodways and uses the FEMA-mapped flood hazard area.

Q11. Is the project within the Flood Hazard Area?

A11. No, the project sits at an elevation that is more than 20 feet above the 1% annual chance flood elevation and thus is not within the regulatory Flood Hazard Area.

Q12. What is the difference between flood inundation hazards and fluvial erosion hazards?

A12. FEMA-designated flood hazard areas show where inundation would occur during a flood that has a 1% chance of occurring in any given year. While this hazard information is very important, the FEMA inundation areas have only been mapped for approximately

20% of Vermont stream miles and post-flood damage surveys have shown that fluvial erosion, not inundation, is the most common natural hazard type in Vermont. River corridors account for the fact that rivers change vertically and horizontally over time, and, therefore, are not as likely to become outdated as FEMA maps, which are based on the elevation and location of the river at the time when the maps are produced. Within river corridors, floodplains may be formed and maintained over time. This means that regulation within river corridors may consistently help mitigate both erosion and inundation hazards in comparison to regulation within their FEMA map counterpart alone.

Q.13 Is Entergy required to obtain a state floodplain permit?

A.13 Yes.

Q14. Has Entergy applied for a state floodplain permit?

A14. No.

Q15. What is the standard for evaluating a project under the Flood Hazard Area and River Corridor Rule and Criterion 1D-Floodways?

A15. Under the Flood Hazard Area and River Corridor Rule and Criterion 1D-Floodways, the Agency looks at impacts to flood hazard areas and river corridors. The Rule requires projects in flood hazard areas and river corridors to meet a No Adverse Impact standard by demonstrating that development will not increase flood elevations or velocities,

decrease flood storage volume, or increase erosion hazards. Additionally, development must comply with floodplain management standards to ensure that flood risk is minimized. In accordance with the DEC Flood Hazard Area and River Corridor Protection Procedure dated December 5, 2014, the Agency makes recommendations to the Public Service Board under Criterion 1D using the same No Adverse Impact and Floodplain Management Standards. However, in accordance with Criterion 1D, the Agency may make any additional recommendations it deems necessary to ensure that development within an Act 250 floodway will avoid restricting or diverting the flow of flood waters and endangering the health, safety, and welfare of the public or of riparian owners during flooding.

Q16. Will the project meet the standards in the Flood Hazard Area and River Corridor Rule and the Flood Hazard Area and River Corridor Protection Procedure?

A16. Yes. The project as proposed will be located behind the existing dry cask storage pad and further away from the Connecticut River. The proposed location meets the No Adverse Impact standard in the Flood Hazard Area and River Corridor Rule and the Flood Hazard Area and River Corridor Protection Procedure since it will not increase flood elevations, velocities, or exacerbate fluvial erosion.

Q17. Does the Agency have any additional concerns under Criterion 1D-Floodways?

A17. No.

Q18. What information would you need from Entergy to issue a state floodplain permit?

A18. An application and supporting documents.

Q19. Does this conclude your testimony?

A19. Yes.

ROBERT E. EVANS
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Williston, VT 05495
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EXPERIENCE:

Vermont Agency of Natural Resources – Department of Environmental Conservation,
Watershed Management Division, Rivers Program, Montpelier, Vermont,
September 2007 – September 2010, November 2011 - Present
River Corridor and Floodplain Protection Program Manager

- Supervise the River Corridor and Floodplain Protection Section of the Vermont Rivers Program: provide leadership and direction to eight staff members on meeting the program's annual goals and grant commitments; conduct annual performance evaluations; authorize timesheets, leave requests, and travel authorizations/expense reports; execute and manage sub-grant agreements;
- Administer the state Flood Hazard Area and River Corridor Rule, including technical assistance, application review, and issuing permit decisions;
- Support local and state regulatory programs including technical reviews of municipal floodplain development proposals and review and comment on Act 250 and Public Service Board proceedings under Criterion 1D-Floodways;
- Serve as State Floodplain Manager/National Flood Insurance Program (NFIP) Coordinator responsible for oversight and coordination of all FEMA Community Assistance Program and Risk MAP activities within the state;
- Prepare and manage FEMA CAP and CTP annual grant budgets, quarterly and annual performance reports, work plan updates, and other required and assigned products and activities;
- Conduct education and outreach to diverse stakeholders on river corridor and floodplain management, mapping, and insurance;
- Monitor and assist community compliance with NFIP regulations, including follow-up negotiations and resolution of contentious and politically sensitive issues and projects;
- Encourage progressive and innovative community approaches to enhanced river corridor and floodplain protection including the identification, mapping and management of river corridors and floodplains;
- Serve as a member of the State Hazard Mitigation Committee and the Project Selection Subcommittee;

Department of Homeland Security, Federal Emergency Management Agency,
Mitigation Division, Floodplain Management & Insurance Branch, Boston, MA,
October 2010 – November 2011
Natural Hazards Program Specialist (GS-12)

- Responsible for the Floodplain Management and Insurance (FM&I) Branch's compliance program: Establish and monitor Community Assistance Visits and Community Assistance Contacts conducted by FEMA and State staff;
- Ensure consistency, timely completion, adequate documentation and follow-up to make sure that communities are meeting the flood loss reduction goals of the National Flood Insurance Program (NFIP) by adequately administering and enforcing their floodplain management regulations;

- Provide NFIP and floodplain management technical assistance to stakeholders in Region I through training, meetings, site visits, and phone calls; specifically, state and federal agencies, municipal officials, engineers, surveyors, developers, homeowners, non-governmental organizations and congressional staff;
- Serve as the FM&I Branch's technical expert on riverine hydrology, hydraulics, fluvial geomorphology, and Geographic Information Systems (GIS);
- Serve as a Geographic Information System Specialist in the Geospatial Intelligence Unit during Emergency Assignment activation at the Regional Response Coordination Center;
- Served as the Floodplain Management Group Supervisor at the Burlington Joint Field Office for federally declared disasters 1995, 4001, and 4006.

Wyoming Department of Environmental Quality, Cheyenne, Wyoming,
January 2005 – August 2007:

Abandoned Mine Land Division
May 2006-August 2007
Project Manager/Hydrologist

- Reviewed engineering designs and hydrologic, hydraulic, and geomorphic calculations to ensure adequate watershed restoration of abandoned mine sites; coordinate technical reviews of designs with Abandoned Mine Land Division (AML) discipline specialists;
- Managed multiple AML reclamation projects, including consulting engineers and construction contractors; with wide latitude provided by the division Administrator; independently responsible for successful completion of each project;
- Provided contract administration by tracking budgets, authorizing requests for payment, processing amendments/change orders, issuing task and field orders, and maintaining communication between design engineers, construction contractors, accountants, procurement staff, the Assistant Attorney General, and outside state and federal agencies as necessary;
- Responsible for 7.4 million dollars in design and construction contracts;
- Served as chair and member of selection committees for engineering services contracts including reviews statements of interest, technical/cost proposals, conducting interviews, final selection, and contract negotiation;
- Represented AML as the software liaison for the Federal Office of Surface Mining's Technical Innovation and Professional Services (TIPS) program; as one of the expert contacts listed on the TIPS website, provide technical guidance in response to western region inquiries regarding the SEDCAD, HEC-RAS, and RUSLE hydrology/hydraulics/sedimentology software programs

Land Quality Division
January 2005 – May 2006 (promoted to position in AML Division above)
District 1 Surface Water Hydrologist

- Provided surface water expertise for District 1 which encompasses 8 counties in southeastern Wyoming
- Reviewed surface coal and non-coal mine permits and related documents to ensure technical adequacy and regulatory compliance with respect to baseline hydrologic/hydraulic characterization, determination of probable hydrologic consequences, mine hydrology, and post-mine hydrologic restoration.
- Reviewed hydrologic and hydraulic models/calculations, including stormwater management plans, flood analysis, sediment pond and channel designs, wetlands delineations/mitigation

plans, alluvial valley floor assessments, erosion and sediment control plans, water quantity and quality monitoring plans and data, and soil loss/delivery calculations

Johnson Controls, Inc. - on-site contractor to the U.S. Geological Survey
Fort Collins, Colorado, January 2004 - December 2004 (temporary contract position)
Hydrologist/Data Manager

- Managed hydrologic and riparian data collected from 475 sites in 17 western states;
- Performed retrieval, cleaning, and Bulletin 17B flood frequency analysis of stream flow data;
- Assisted USGS scientists in conducting research on the hydrologic factors influencing river susceptibility to invasion by exotic riparian trees such as tamarisk including literature searches, field work and GIS mapping and analysis;

National Park Service (Colorado State University Cooperative), Water Resources Division, Water Operations Branch
Fort Collins, Colorado. June 2002 – April 2003
Water Quality Data Analyst, Student Position

- Analyzed and compiled water quality data for the generation of service-wide baseline inventory and analysis reports for park units with significant water resources;
- Performed miscellaneous research related to water quality parameters and the EPA's STORET national water quality database;

Loudoun County Department of Building & Development, Engineering Division, Water Resources Section
Leesburg, Virginia. November 1999 – June 2000 (left due to family illness)
Engineer II

- Reviewed hydraulic and hydrologic analyses to ensure that development was in compliance with the county's storm water and floodplain management ordinances;
- Reviewed grading-permit applications to ensure that the state and county erosion and sediment control design criteria were met;
- Provided overall project management for land development applications;

Dewberry & Davis. LLC - Technical Evaluation Contractor to the Federal Emergency Management Agency (FEMA)
Fairfax, VA. January 1996 – November 1999
Section Leader/ Technical Support Specialist

- Managed and led a staff of 8-10 analysts and engineers that prepared amendments and revisions to FEMA's floodplain maps under the National Flood Insurance Program (NFIP) in accordance with Parts 60, 65 and 70 of the NFIP regulations;
- Performed and reviewed hydrologic calculations/modeling for 100-year frequency discharges utilizing the Rational Method, USGS rural and urban Regression Equations, hydrologic software, including the generation of inflow volume hydrographs, Intensity-Duration-Frequency curves, stage-storage curves and hydrograph routing, and flood frequency analysis of USGS gage records;
- Performed and reviewed open channel hydraulic calculations/modeling (including bridge and culvert analyses) for developing 100-year frequency flood elevations using the hydraulic software listed below;
- Prepared and concurred on official FEMA correspondence including special and congressional responses and final letters of map revision and amendment;

- Coordinated with FEMA Project Engineers, private sector engineers/surveyors, homeowners, developers, and state and local government officials;
- Taught in-house courses on base flood elevation development for unstudied flooding sources and on NFIP map amendment/revision processing and regulations. Taught NFIP amendments/revisions processing at FEMA's Emergency Management Institute

EDUCATION:

MS in Watershed Science, August 2004
Colorado State University, Fort Collins, Colorado

Thesis: *Surface Coal Mining in Watering Trough Gulch; Determination and Mitigation of Probable Hydrologic Consequences* (83 pages + appendices)

BS in Environmental Science, May 1995
Mary Washington College, Fredericksburg, Virginia

PROFESSIONAL REGISTRATION:

Certified Floodplain Manager, #US-08-03261 (Association of State Floodplain Managers)

SKILLS:

Hardware

- PCs, Trimble GeoXT/XM GPS

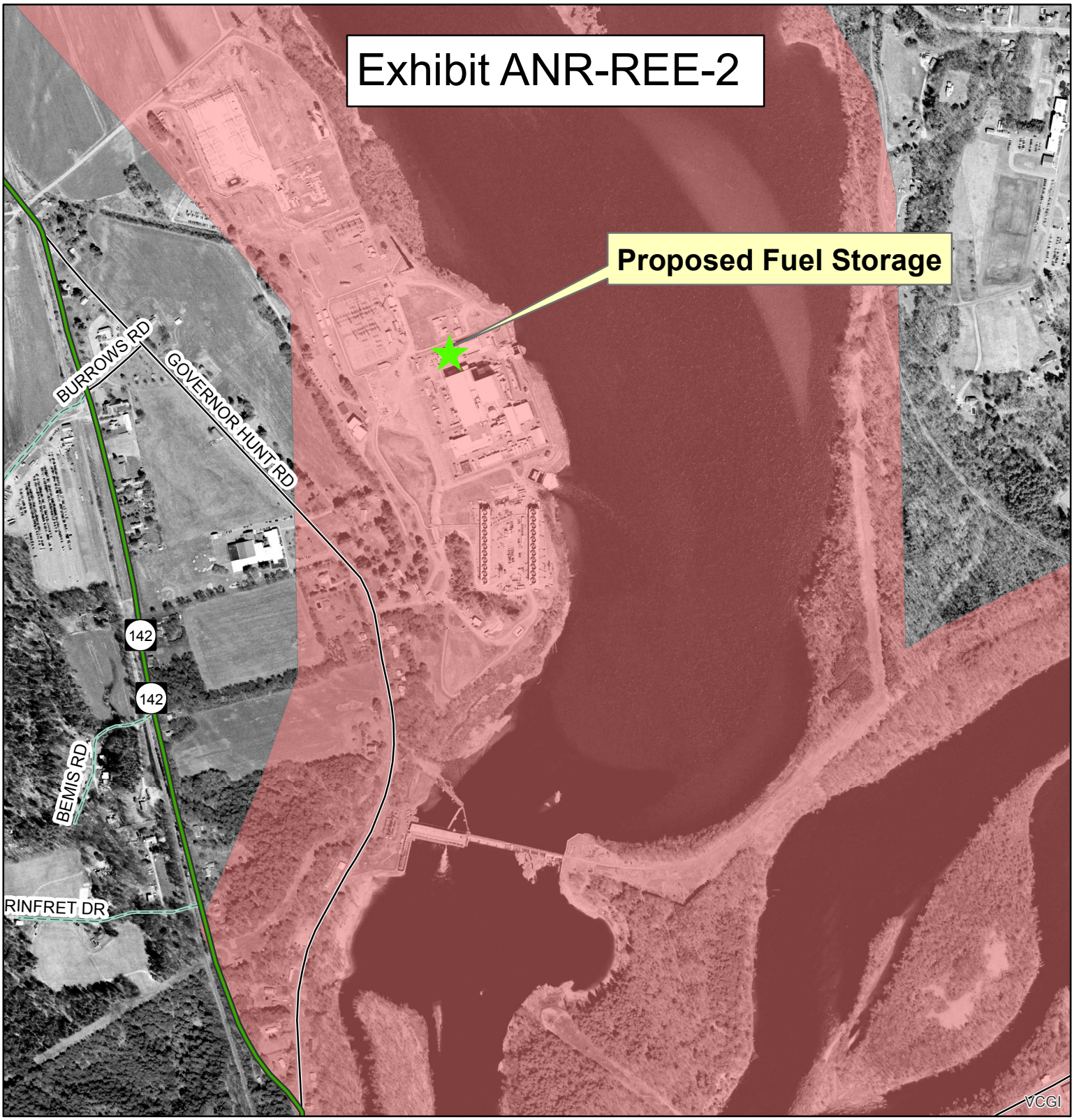
Software

- Microsoft Word, Excel, PowerPoint, Project, some Access, ArcGIS 9.3, Trimble Pathfinder Office,
- Hydrologic and Hydraulic Modeling: NRCS TR55, HEC-1, HEC-HMS, HEC-2, HEC-RAS, SEDCAD4, HEC-FFA and PeakFQ (Bulletin 17B procedures), Quick-2, WinXSPro, and HY8

ACTIVITIES AND AFFILIATIONS:

- Member; Association of State Floodplain Managers
- Member; Golden Key International Honour Society

Exhibit ANR-REE-2



CT River Corridor at Vernon, VT

DEC Watershed Management Division
River Corridor and Floodplain Protection

Created 08.14.2015

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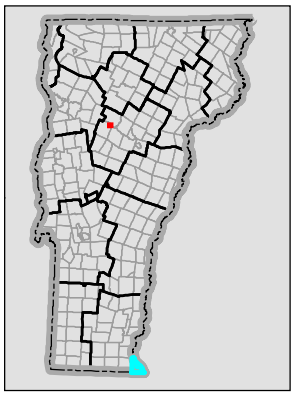

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Legend

CT River Corridor

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