COMMONWEALTH OF MASSACHUSETTS
Energy Facilities Siting Board

In the Matter of the Petition of Nickel Hill Energy, LLC, for Approval to Construct a Bulk Generating Facility in the Town of Dracut, Massachusetts	)))))	EFSB 99-3

FINAL DECISION

Denise L. Desautels
Hearing Officer
November 13, 2000

On the Decision:
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TABLE OF CONTENTS

LIST OF ABBREVIATIONS

Abbreviation	Explanation
AALs	Allowable Ambient Levels
ACGIH	American Conference of Governmental Industrial Hygienists
Ammonia slip	Emission of added ammonia
Andover	Town of Andover
Andover Breast Cancer Report	Evaluation of Breast Cancer Incidence in Andover, MA: 1987-1994 (1998)
ANP Bellingham Decision	ANP Bellingham Energy Company, 7 DOMSB 39 (1998)
ANP Blackstone Decision	ANP Blackstone Energy Company, 8 DOMSB 1 (1999)
AOD	Ammonia-on-demand
APCD	Air Pollution Control District
ATR	Automatic traffic recorder counts
BACT	Best available control technology
background	Ambient concentrations in air as measured at representative MADEP monitoring locations
BG&E	Baltimore Gas and Electric Company
BLSF	Bordering Land Subject to Flooding
Board of Selectmen	Board of Selectmen of the Town of Dracut
Brockton Power Decision	Brockton Power LLC, 10 DOMSB 157 (2000)
Brox	Brox Industries, Inc.
Brox Industries	Brox Industries, Inc.
Brox properties	450-acre contiguous lots owned by Brox Industries, Inc.
Bruton/Vrountas	Catherine M. Bruton and Christopher T. Vrountas, Interested Person
BVW	Bordering Vegetated Wetlands
c.	Chapter
cfs	Cubic feet per second
CMR	Code of Massachusetts Regulations
CO	Carbon monoxide

CO_2	Carbon dioxide
Company	Nickel Hill Energy, LLC
Company Brief	Nickel Hill's Brief
Company Reply Brief	Nickel Hill's Reply Brief
Company Supplemental Brief	Nickel Hill's Supplemental Brief
Company Supplemental Reply Brief	Nickel Hill's Supplemental Reply Brief
Constellation	Constellation Power, Inc.
dBA	Decibels, A-weighted
DEIR	Draft Environmental Impact Report
Devens	Devens Commerce Center
Devens site	Candidate site at the Devens Commerce Center
Dighton Power Decision	Dighton Power Associates, 5 DOMSB 193 (1997)
DOMSB	Decisions and Orders of Massachusetts Energy Facilities Siting Board
DOMSC	Decisions and Orders of Massachusetts Energy Facilities Siting Council
Dracut	Town of Dracut
EMF	Electric and magnetic fields
EPA	The United States Environmental Protection Agency
EPC	Engineering, procurement, and construction
Epsilon	Epsilon Associates, Inc.
F	Fahrenheit
FEIR	Final Environmental Impact Report
FOG	FOG atmospheric model
450-acre Brox properties	Contiguous lots owned by Brox Industries, Inc.
GEP	Good Engineering Practice
G. L.	Massachusetts General Laws
GLSD	Greater Lawrence Sanitary District
gpd	Gallons per day

HAPs Study	Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units - Final Report to Congress (1998)
HRSG	Heat recovery steam generator
Hz	Hertz (cycles per second)
I-L	Light Industrial zoning, in Dracut; or Limited Industrial District, in Methuen
IDC Bellingham Decision	IDC Bellingham, LLC, 9 DOMSB 260 (1999)
Incinerator Study Critique	Ignoring Motherhood, Milk, and Mercury (1998)
I-495	Interstate Route 495
I-93	Interstate Route 93
ISCST3	Industrial Source Complex Short-Term Model, Version 3
kV	Kilovolt
kV/m	Kilovolts per meter
LAER	Lowest Achievable Emission Rate
L_{dn}	Day-night average sound level incorporating a 10 dBA penalty to sound at night
L_{eq}	Equivalent sound level; level of steady sound with equivalent average sound energy
L_{90}	Sound level exceeded 90 percent of the time during a measurement period
LOS	Levels of service – a measure of the efficiency of traffic operations at a given location
LRWU	Lowell Regional Wastewater Utility
LUW	Land Under Water Bodies and Waterways
M&NE	Maritimes & Northeast Pipeline, L.L.C.
MADEP	Massachusetts Department of Environmental Protection
MADPH	Massachusetts Department of Public Health
MADPH Cancer Incidence Report	Cancer Incidence in Massachusetts 1987-1994: City/Town Supplement (1997)
MEPA	Massachusetts Environmental Protection Act
Merrimack Valley Report	The Health of the Merrimack Valley (1998)

Methuen	City of Methuen
mG	Milligauss
mgd	Million gallons per day
Millennium Power Decision	U.S. Generating Company, 6 DOMSB 1 (1997)
MMBtu	Million British thermal units
MRI	Merrimack River Initiative
MRWC	Merrimack River Watershed Council
MVRE	Merrimack Valley Residents for the Environment, Inc.
MW	Megawatts
MWH	Megawatt-hours
MWRA	Massachusetts Water Resources Authority
n.	Footnote
NAAQS	National ambient air quality standards
NEA Decision	Northeast Energy Associates, 16 DOMSC 335 (1987)
NEP	New England Power Company
NEPOOL	New England Power Pool
NESWC	Northeast Solid Waste Committee
1985 MECo/NEPCo Decision	Massachusetts Electric Company et al., 13 DOMSC 119 (1985)
Nickel Hill	Nickel Hill Energy, LLC
NO_2	Nitrogen dioxide
NO_X	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council
NSPS	New source performance standards
NSR	New source review
OSHA	Occupational Safety and Health Administration
PM	Particulate matter
PM_{10}	Particulates (10 microns or less)

ppm	Parts per million (by volume for gases)
PSD	Prevention of significant deterioration
RFA	Riverfront Area
RMP	Risk Management Plan
ROW	Right-of-way
SACTI	Seasonal/Annual Cooling Tower Plume Impact model
$SCONO_X$	$SCONO_X$ pollution control technology
SCR	Selective Catalytic Reduction
SCREEN3	SCREEN3 atmospheric dispersion model
7Q	Lowest seven-day average flow (recurrence unspecified)
7Q10	Lowest seven-day average flow with a recurrence interval of once every ten years
7Q100	Lowest seven-day average flow with a recurrence interval of once every one hundred years
SFEIR	Supplemental Final Environmental Impact Report
SILs	Significant impact levels
Silver City Decision	Silver City Energy Limited Partnership, 3 DOMSB 1 (1994)
Sithe Edgar Decision	Sithe Edgar Development LLC, 10 DOMSB 1 (2000)
Sithe Mystic Decision	Sithe Mystic Development LLC, 9 DOMSB 101 (1999)
Sithe West Medway Decision	Sithe West Medway Development LLC, 10 DOMSB 274 (2000)
Siting Board	Energy Facilities Siting Board
Siting Council	Energy Facilities Siting Council
Special Permit	Town of Dracut special permit and site plan approval
SO_2	Sulfur dioxide
SWPPP	Stormwater Pollution Prevention Plan
TELs	Threshold effects exposure limits
Tennessee	Tennessee Gas Pipeline Company
TPS	Technology Performance Standards
tpy	Tons per year

25-acre site	Site proposed for lease to Nickel Hill Energy, LLC
µg/dL	Micrograms per deciliter
$\mu g/m^3$	Micrograms per cubic meter
USGS	United States Geological Survey
VOC	Volatile organic compounds
XONON	XONON pollution control technology

The Energy Facilities Siting Board ("Siting Board") hereby APPROVES, subject to conditions, the petition of Nickel Hill Energy, LLC to construct a net nominal 750-megawatt combined-cycle generating facility at the proposed site in Dracut, Massachusetts.

I. INTRODUCTION

A. Description of the Proposed Facility, Site, and Interconnections

Nickel Hill Energy, LLC ("Nickel Hill" or "Company") has proposed to construct a natural gas-fired, combined-cycle bulk electric generating facility with a net nominal electrical output of 750 megawatts ("MW") in Dracut, Massachusetts ("generating facility" or "proposed facility") (Exh. NHE-1, at 1-1). Nickel Hill proposes to locate the proposed facility on a recently subdivided 25 acre lot ("25-acre site") within 450 acres of contiguous properties owned by Brox Industries, Inc. ("Brox" or "Brox Industries") (id.; Exhs. EFSB-LU-6; RR-EFSB-49). Nickel Hill stated that the 25-acre site is bounded by Methuen Street to the south; the Methuen/Dracut town line to the east; and Brox Industries quarrying, crushing, and batch plant operations to the north and west (Exhs. EFSB-G-5, Att; RR-TD-3; RR-EFSB-49).[1]

The switchyard would be located adjacent to the turbine building (Exhs. EFSB-G-4; INT-MVRE-G-7(d), Bulk Att. at 3-8). The proposed facility would interconnect with an existing New England Power Company ("NEP") 345 kilovolt ("kV") line which crosses the Brox properties approximately 4,200 feet to the west of the proposed facility (Exhs. EFSB-G-4; RR-EFSB-49; Tr. 1, at 38). A single interconnect would be made to the Tennessee Gas Pipeline Company ("Tennessee") gas pipeline at the joint facilities portion of the Maritimes and Northeast Pipeline, L.L.C. ("M&NE") gas pipeline located on Brox property, enabling the proposed project to access gas from more than one system (Exhs. NHE-1, at 2-1; NHE-2, at 3-10).[2] Nickel Hill has

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[1] The rock quarry operation and asphalt batch plant on Brox property would, with certain exceptions, continue to operate during the construction and operation of the proposed facility (Exhs. NHE-1, at 1-1; RR-MVRE-7).

[2] "Interconnection with the M&NE gas pipeline would require the construction of a lateral to the point of Nickel Hill's proposed interconnection with the Tennessee gas pipeline located on Brox property, beyond the boundaries of the 25-acre site (Tr. 1, at 21-22, 34).

(continued...)

executed a term sheet with Brox Industries for the potential lease and option to purchase of the 25-acre site and four-acre site, and for a proposed gas pipeline easement and proposed 150-foot wide overhead aerial-rights easement for an electric interconnection (Exhs. RR-MVRE-7; RR-EFSB-49; Tr. 1, at 18-19; Tr. 18, at 2183).[3] Neither the electric interconnect nor the interconnect with the Tennessee gas pipeline would require an easement beyond the 450-acre Brox properties (Tr. 1, at 21).

Nickel Hill indicated that it would construct a 30-foot wide access road ("25-acre site access road") from Methuen Street to the proposed facility using Town of Dracut ("Dracut") specifications for public roads (Exhs. EFSB-G-5; RR-MVRE-7). In addition, Nickel Hill indicated that Brox Industries intends to relocate the existing Brox access road which connects Route 110 to Methuen Street (Exhs. RR-MVRE-8; RR-TD-10, Att.; Tr. 4, at 421-22).

The proposed facility would obtain cooling and process water from the Merrimack River. The proposed subaqueous infiltration bed system for plant cooling-water usage would be located in the Merrimack River along Route 110 (Exhs. EFSB-G-13C; EFSB-WL-2, Att. at 12 (fig. 20); Tr. 1, at 28; Tr. 15, at 1896).

The proposed facility would include the following major components and structures: two Siemens-Westinghouse or Mitsubishi Heavy Industries "G" technology combined-cycle combustion turbines with steam injection capability and two 170-foot stacks, two heat recovery steam generators ("HRSGs"), one steam turbine generator, and a wet mechanical cooling system (Exhs. EFSB-A-2, Att.; INT-MVRE-G-7(a), Att.; Tr. 1, at 113). The proposed facility also would be equipped with a Selective Catalytic Reduction ("SCR") system for nitrogen oxides ("NO_X") control and oxidation catalyst for carbon monoxide ("CO") control (Exh. INT-MVRE-G-7(a), Att. at 2-2). The turbines would be housed in an 80,000 square-foot building (id.).

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[2] (...continued)
Connection to both gas pipelines would be accomplished with a common header system at the point of interconnection (Exhs. EFSB-G-13(c); INT-MVRE-G-7(a), Bulk Att. at 3-7; Tr. 1, at 21, 119-121; Tr. 4, at 447-448).

[3] Nickel Hill stated that it is negotiating a noise easement with Brox Industries to be executed contemporaneously with its anticipated lease agreement (Exh. RR-EFSB-73).

Ancillary equipment would include wet mechanical cooling towers, water and wastewater treatment systems, water and wastewater storage tanks, main and auxiliary transformers, a 345 kV switchyard, and administrative and maintenance facilities (id.).

Nickel Hill is a wholly-owned subsidiary of Constellation Power, Inc. ("Constellation") which is a non-utility power generation affiliate of Baltimore Gas and Electric Company ("BG&E") (Exhs. NHE-1, at 1-1; NHE-2, at 2-1; INT-MVRE-G-7(d), Bulk Att. at 2-1; RR-EFSB-34). Constellation and its affiliates develop, own, and operate power projects in the United States and Latin America (Exh. RR-EFSB-34).[4]

B. Procedural History

On April 1, 1999, Nickel Hill filed with the Siting Board a petition to construct and operate a net nominal 750 MW natural gas-fired, combined-cycle generating facility in Dracut, Massachusetts. The Siting Board docketed the petition as EFSB 99-3.

On May 12, 1999, the Siting Board conducted a public hearing in Dracut. In accordance with the direction of the Hearing Officer, Nickel Hill provided notice of the public hearing and adjudication.

Sixty-three timely petitions to intervene were filed[5] along with three untimely petitions to intervene and four timely petitions to participate as interested persons. Nickel Hill filed a response opposing all petitions to intervene except those filed by Dracut, the Town of Andover ("Andover"), the City of Methuen ("Methuen"), and the Merrimack River Watershed Council

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[4] A corporate restructuring occurred in May 1999, which changed the relationship between Constellation and BG&E (Exh. RR-EFSB-34, Att; Tr. 8, at 1039). At the time the petition was filed, Constellation was a subsidiary of BG&E (Tr. 8, at 1039). Following the May 1999 corporate restructuring, BG&E and Constellation became subsidiaries of Constellation Energy Group, Inc. and thus affiliates of each other (Exh. RR-EFSB-34; Tr. 8, at 1039).

[5] Of the 63 timely filed petitions, 52 followed the same basic format ("form petitions") and did not adequately state how the individual petitioner might be substantially and specifically affected by the proceeding. In addition, one petition in a similar format was signed by 38 residents of Dracut and the City of Methuen and filed as a joint petition ("group petitioners").

("MRWC"). Nickel Hill filed a supplemental response addressing late-filed petitions and a supplemental response addressing petitioners' replies.

The Hearing Officer granted the timely petitions to intervene filed by Dracut, Methuen, Andover, the Merrimack Valley Residents for the Environment, Inc. ("MVRE"), and MRWC. Nickel Hill Energy, LLC, EFSB 99-3 (Hearing Officer Procedural Order, June 25, 1999, at 16-17). The Hearing Officer also granted the petitions to intervene of Liese M. Elerin, John R. Klein, Dino Realty Trust, and joint petitioners Robert P. Beatty and Reba J. Beatty. Id. at 10; Nickel Hill Energy, LLC, EFSB 99-3 (Hearing Officer Procedural Order, July 16, 1999).

The Hearing Officer denied the petitions to intervene of the fifty-two form petitioners and the thirty-eight group petitioners and instead allowed these petitioners to participate as interested persons. Nickel Hill Energy, LLC, EFSB 99-3 (Hearing Officer Procedural Order, June 25, 1999, at 18-20).[6] The Hearing Officer also denied the petitions to intervene of S. James Boumil, Marvin Laut, joint petitioners Donald McCandless and Joanne McCandless, and joint petitioners Catherine M. Bruton and Christopher T. Vrountas ("Bruton/Vrountas"), and instead allowed these petitioners to participate as interested persons. Id.

The Hearing Officer also granted the four timely petitions seeking leave to participate as interested persons filed by NEP, Sigma Consultants, U.S. Generating Company, and Andover Village Improvement Society. Id. at 20. The untimely petitions of Councilor Stephen Zanni, joint petitioners Gary and Sharon Gillespie, and joint petitioners Francine and David O'Shea were denied by the Hearing Officer as to intervention and for leave to participate as an interested person on the basis of untimely filing without good cause shown. Id. at 21.

The Siting Board initially conducted fifteen days of evidentiary hearings, commencing on October 14, 1999, and ending on December 27, 1999. Nickel Hill presented the testimony of the following witnesses: Thomas G. Favinger, Business Development Manager, Constellation, who testified as to project description and site selection; Theodore A. Barten, P.E., Managing

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[6] The form petitioners were allowed to participate as a single interested person with a designated spokesperson and the group petitioners were allowed to participate as a single interested person with a designated spokesperson. Nickel Hill Energy, LLC, EFSB 99-3 (Hearing Officer Procedural Order, June 25, 1999, at 20).

Principal of Epsilon Associates, Inc. ("Epsilon"), who testified as to project overview, site selection, and land use, solid waste, visual, safety, and traffic impacts; Dale T. Raczynski, P.E., Principal of Epsilon, who testified as to technology performance standards and air quality impacts; Elizabeth M. Hendrick, Senior Air Quality Meteorologist at Epsilon, who testified as to technology performance standards, and air quality impacts; Andrew D. Magee, Senior Project Manager at Epsilon, who testified as to water resources, wetlands, and traffic impacts; David B. Grogan, President, D. B. Grogan Associates, Inc., who testified as to project overview, site selection, and water resources, wetlands, noise, and safety impacts; David N. Keast, P.E., who testified as to noise impacts, and Peter A. Valberg, Ph.D., Senior Scientist at Cambridge Environmental, Inc., who testified as to electric and magnetic fields ("EMF") and public health impacts.

The Town of Dracut presented the following witnesses: Keith H. Kennedy, Vice President of Tech Environmental, Inc., who testified as to air quality, noise, visual, construction, traffic, and public health impacts; Peter H. Guldberg, President of Tech Environmental, Inc., who testified as to air quality, noise, visual, safety, and construction impacts; Edward J. Schmidt, P.E., Ph.D., Senior Consultant, Shevenell-Gallen and Associates, Inc., who testified as to water impacts; and Andrew J. McCusker, Principal and Owner of Mackworth Environmental Management, who testified as to water impacts. MVRE presented the testimony of Everett F. Penney, Jr., Director of Public Health, Town of Andover, who testified as to public health impacts, and Julie Watts, MPH, Boston University School of Public Health Ph.D. candidate, who testified as to public health impacts.[7]

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[7] MVRE also sought to sponsor additional prefiled testimony as part of its direct case. In response to Nickel Hill's Motion to Strike and/or Clarify MVRE's Direct Case, MVRE was not permitted to introduce additional testimony of Messrs. Penney and Hajec and Ms. Watts because MVRE did not timely seek to have such testimony introduced. Nickel Hill Energy, LLC, EFSB 99-3 (Hearing Officer Ruling, November 22, 1999). In addition, the Hearing Officer determined that certain assertions made by MVRE's counsel did not constitute evidence because counsel did not present himself as an expert witness and there was no indication counsel had direct personal knowledge of such information. Id. (Hearing Officer Ruling at 6-7). Further, counsel did not provide information regarding his experience and qualifications that would have allowed him to qualify to testify about

(continued...)

On March 2, 2000, Nickel Hill, Dracut, MVRE, Andover, and Bruton/Vrountas submitted their respective initial briefs. On March 10, 2000, Nickel Hill, Dracut, MVRE, and Andover submitted their respective reply briefs. On June 2, 2000, Nickel Hill filed a Supplemental Final Environmental Impact Report ("SFEIR") which addressed specific issues raised in the Secretary of Environmental Affair's Certificate on the Final Environmental Impact Report ("FEIR"), namely, alternative air and water technologies, the feasibility of zero ammonia technologies, the potential to further reduce volatile organic compounds emissions, and noise impacts.[8] Because the new information in the SFEIR, included, inter alia, air quality data and an analysis of cooling technologies, information which may be relevant to the Siting Board's analysis of the minimization of environmental impacts and costs of the proposed facility, the Siting Board conducted additional evidentiary hearings on August 3, 2000, and August 15, 2000. These hearings were limited in scope to new information presented in the SFEIR which is under the jurisdiction of the Siting Board (Tr. 18, at 2103-2104; Tr. 19, at 2316-2317). Nickel Hill Energy, LLC, EFSB 99-3 (Hearing Officer Ruling, at 4). Parties were permitted to submit supplemental briefs relative to the SFEIR. On August 25, 2000, Bruton/Vrountas filed a supplemental brief. Supplemental briefs were filed by Nickel Hill, Dracut, MVRE, and Andover on August 28, 2000. On September 6, 2000, Nickel Hill, Dracut, and MVRE filed supplemental reply briefs. The record includes 941 exhibits consisting primarily of information request responses and record request responses.

C. Jurisdiction and Scope of Review

As a generating unit with a design capacity of approximately 750 MW, Nickel Hill's

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7 (...continued)
such issues. Id. (Hearing Officer Ruling at 6-7).

8 On June 22, 2000, the Hearing Officer issued a ruling denying MVRE's request to conduct discovery upon the SFEIR and granting its motion for an additional evidentiary hearing on the new information contained in the SFEIR and for supplemental briefing.

proposed project[9] falls squarely within the first definition of "facility" set forth in G. L. c. 164, § 69G, which states, in pertinent part, that a facility is a generating unit defined as:

> any generating unit designed for or capable of operating at a gross capacity of 100 megawatts or more, including associated buildings, ancillary structures, transmission and pipeline interconnections that are not otherwise facilities, and fuel storage facilities.

In accordance with G. L. c. 164, § 69J¼, before approving a petition to construct a generating facility, the Siting Board must determine that the applicant has met five requirements. First, the Siting Board must determine that the applicant's description of the site selection process used is accurate (see Section II., below). Second, the Siting Board must determine that the applicant's description of the proposed generating facility and its environmental impacts are substantially accurate and complete (see Section III., below). Third, the Siting Board must determine that the proposed generating facility will minimize the environmental impacts consistent with the minimization of costs associated with the mitigation, control, and reduction of the environmental impacts (see Section III., below). Fourth, the Siting Board must determine that plans for construction of the proposed generating facility are consistent with current health

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[9] Andover asserts that Nickel Hill lacks standing to seek approval from the Siting Board, arguing that Nickel Hill does not have a legally cognizable interest in the "premises" upon which it seeks to construct its proposed facility, and therefore may not seek a land use permit (Andover Brief at 1-2). This argument fails on two grounds. First, Nickel Hill does have a legally cognizable interest in the 25-acre site through its executed term sheet for the purchase or long-term lease of the 25-acre site for the development, construction, and operation of a power plant (Exhs. EFSB-G-10; RR-MVRE-7; Tr. 1, at 15; Tr. 7, at 912). Second, and more important, neither the Siting Board's statute nor its implementing regulations require that an applicant possess a "legally cognizable interest" either prior to requesting the Siting Board's approval to construct an energy facility, or prior to receiving it. In fact, the statute clearly contemplates that an approval could be granted without such interest, since it includes provisions for the taking of property by eminent domain for an energy facility such as a transmission line subsequent to Siting Board approval of the facility. See G. L. c. 164, § 69R. Andover's argument that because developers of generating facilities proposed under G. L. c. 164, § 69J¼ are no longer required to notice two sites, they should therefore be held to a higher standard than developers of other facilities and required to have a legally cognizable interest in the proposed site may have some merit from a policy perspective, but cannot create a standing requirement where one does not presently exist.

and environmental protection policies of the Commonwealth and with such energy policies as are adopted by the Commonwealth for the specific purpose of guiding the decisions of the Board (see Section IV., below). Finally, if the expected emissions from the proposed facility do not meet the applicable technology performance standard, the Siting Board must determine, based on a comparison with other fossil fuel generating technologies, that the proposed generating facility on balance contributes to a reliable, low-cost, diverse regional energy supply with minimal environmental impacts.[10]

MVRE has argued, based on the Siting Board's mandate to "provide a reliable energy supply for the Commonwealth," that the Siting Board must also determine that power from the Nickel Hill facility would be sold within Massachusetts in order to approve the facility (MVRE Brief at 3-6). This argument is contradicted by the express language of the Siting Board's statute, which reads in pertinent part:

> [The Siting Board] shall implement the provisions contained in sections 69H to 69Q inclusive, so as to provide a reliable energy supply for the commonwealth with a minimum impact on the environment at the lowest possible cost. To accomplish this . . . the board shall review only the environmental impacts of generating facilities, consistent with the commonwealth's policy of allowing market forces to determine the need for and cost of such facilities. Such reviews shall be conducted consistent with section 69J ¼ for generating facilities. G. L. c. 164, § 69H.

The question of where power produced by the proposed facility will be sold is unrelated to the environmental issues which the Siting Board is authorized to investigate, and is inextricably linked to the issues of need and cost which the Siting Board has been directed to leave to market forces. Consequently, the Siting Board finds that this issue is not properly within the scope of review for cases brought before the Siting Board pursuant to G. L. c. 164, § 69J¼.

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[10] As set forth in Section III.B, below, the Siting Board finds that the expected emissions from the proposed generating facility do not exceed the technology performance standard specified in 980 CMR, § 12.00. Therefore, a generating technology comparison is not required in this case.

II. SITE SELECTION

A. Standard of Review

G. L. c. 164, § 69J¼ requires the Siting Board to determine whether an applicant's description of its site selection process is accurate. An accurate description of an applicant's site selection process shall include a complete description of the environmental, reliability, regulatory, and other considerations that led to the applicant's decision to pursue the project as proposed at the proposed site, as well as a description of other siting and design options that were considered as part of the site selection process. G. L. c. 164, § 69J¼.

The Siting Board also is required to determine whether a proposed facility provides a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. G. L. c. 164, § 69H. To accomplish this, G. L. c. 164, § 69J¼ requires the Siting Board to determine whether "plans for the construction of a proposed facility minimize the environmental impacts consistent with the minimization of costs associated with the mitigation, control, and reduction of the environmental impacts of the proposed generating facility." G. L. c. 164, § 69J¼. Site selection, together with project design and mitigation, is an integral part of the process of minimizing the environmental impacts of an energy facility. The Siting Board therefore reviews the applicant's site selection process in order to determine whether that process contributes to the minimization of environmental impacts of the proposed project and the costs of mitigating, controlling, and reducing such impacts. In making this determination, the Siting Board also will consider, consistent with its broad mandate under G. L. c. 164, § 69H, the reliability, regulatory, and other non-environmental advantages of the proposed site. Id.

B. Description

Nickel Hill Energy, LLC, is a wholly-owned subsidiary of Constellation (Exhs. NHE-1, at 1-1; NHE-2, at 2-1; INT-MVRE-G-7(d), Bulk Att. at 2-1; RR-EFSB-34). Constellation is a non-utility power generation affiliate of BG&E with direct ownership positions in 34 energy projects that are under construction or in operation (Exhs. NHE-1, at 1-1; RR-EFSB-34; Tr. 1, at 150).

The Company indicated that Constellation identified New England, and specifically

Massachusetts, as a potentially attractive location for development of power generation projects (Exh. NHE-1, at 2-3). Constellation stated that it considered New England attractive because: (1) many New England states, including Massachusetts, were in the process of deregulating electricity generation; (2) New England offered a favorable regulatory framework; (3) the regional economy was strong; and (4) the competition included many older, inefficient generating facilities (Exh. EFSB-SS-1, at 1).

The Company stated that Constellation identified six candidate sites for development of an electric generating facility (Exh. NHE-1, at 2-6).[11] The sites were located in Norwich, Connecticut; Orrington, Maine; Wallingford, Connecticut; Pawtucket, Rhode Island; Dracut, Massachusetts; and at the Devens Commerce Center ("Devens site"), located in Ayer, Harvard, and Shirley, Massachusetts (id. at 2-6 to 2-7). The Company stated that Constellation identified the three candidate sites in Maine and Massachusetts by mapping the intersections of natural gas and transmission lines, looking for individual sites near these intersections, and then confirming each site's potential with a site visit (Tr. 1, at 154-155, 160). The Company indicated that the Rhode Island and Connecticut sites were brought to the attention of Constellation by owners of the properties or their representatives (Tr. 1, at 157-158; Exh. EFSB-SS-2, at 2). The Company stated that Constellation did not review the various sites with any preconceived idea of plant size or cooling technology (Exh. EFSB-SS-1(d, e); Tr. 3, at 303).

The Company indicated that Constellation considered the following factors in evaluating potential sites for development: (1) close proximity to a natural gas pipeline with sufficient capacity; (2) close proximity to major electric transmission lines; (3) proximity to an adequate water supply for cooling purposes; (4) existence of any required sanitary and industrial sewer connections; (5) location within a community that supported development of an appropriate generation facility; (6) adequate acreage of buildable land; (7) location in an industrial area with zoning that is compatible with industrial and commercial uses; (8) "reasonable" distances from

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[11] The Company stated that Constellation also investigated the possibility of purchasing existing facilities with the potential for expansion, but that for various reasons Constellation either did not pursue or did not submit winning bids on these properties (Exh. EFSB-SS-3; Tr. 2, at 223).

residential neighborhoods; (9) minimum impact on sensitive land uses such as schools and hospitals and on wetlands; and (10) manageable road access (Exh. NHE-1, at 2-3, 2-4). The Company indicated that the eventual real estate costs of acquiring properties was not a significant differentiating factor among candidate sites (Tr. 3, at 346, 355). The Company stated that each site was evaluated against selection criteria but that a quantitative numerical scoring system was not used (Exh. EFSB-SS-1, at 2).[12]

The Company indicated that while each of the six candidate sites fulfilled some of Constellation's criteria, five of the sites had various deficiencies (Exh. NHE-1, at 2-6 to 2-7). The Company indicated that the Norwich, Connecticut, site already contains an existing generation facility, but the site is small, has less than optimal access to gas and electrical transmission, and is close to residential neighborhoods and wetlands (id. at 2-6; Tr. 1, at 164). The Company stated that the Orrington, Maine, site is well buffered from residential areas and is close to gas and electrical transmission; however, the existence of a north-south electrical transmission congestion point between the site and load centers in southern New England made the site less attractive to the Company (Exh. NHE-1, at 2-6, 2-7; Tr. 1, at 169).[13] The Company stated that the Wallingford, Connecticut, site contains an existing generation facility, but the site is small and close to residential neighborhoods (Exh. NHE-1, at 2-7; Tr. 2, at 196). The Company indicated that the Pawtucket, Rhode Island, site has available gas and electrical transmission, but the site is small, is highly visible from Interstate Route 95 ("I-95") and adjacent areas potentially slated for redevelopment, and has some existing site contamination from a former coal gasification plant (Exh. NHE-1, at 2-7; Tr. 2, at 202-204). The Company explained that based on discussions with local officials, the Company determined that the Devens site is not

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12 The Company provided a table for each of the six sites, categorizing each site as "favorable", "neutral", or "unfavorable" for a variety of environmental criteria (Exh. EFSB-SS-1). The Company stated that the Dracut site was "clearly the most attractive site in comparison to each of the other sites on the candidate list" (id. at 8).

13 The Company stated that a large amount of generation capacity is under development in Maine, and presented New England Power Pool ("NEPOOL") data showing that transmission between Maine and New Hampshire is limited to 1,150 to 1,400 MW (Exhs. DR-MVRE-4 and -4(a), Att.).

reliably available for development of a generating facility (Exh. EFSB-SS-1, at 6; Tr. 3, at 325). The Company also stated that availability of water appeared to be less than optimal and that favorable access to gas and electrical transmission were each about 20 miles away from the Devens site (Exh. NHE-1, at 2-7; Tr. 3, at 333).[14] The Company came to the conclusion it would likely have to pay the full costs for gas pipeline construction to the site (id.).

Constellation asserted that the Dracut site: (1) is close to natural gas pipelines; (2) is close to electric transmission lines; (3) has an adequate water supply; (4) is close to an industrial sewer connection; (5) enjoys community support;[15] (6) has adequate acreage; (7) is properly zoned and compatible with electricity generation; (8) is not unduly close to residences; and (9) allows for development with minimal impacts on surrounding land uses (Exh. NHE-1, at 2-7 to 2-8). Constellation concluded that the Dracut site is well suited for a generating facility (id. at 2-8).

C. Positions of the Parties

Intervenors MVRE and Bruton/Vrountas criticized Nickel Hill's site selection process on several grounds. First, MVRE argued that the selection of a site in the Merrimack Valley gives rise to substantial environmental effects that would not exist in other locations, related to the "already significantly polluted environment in the Merrimack Valley" (MVRE Brief at 8, 9). Second, MVRE argued that the site selection process was inadequate because it did not include any suitable alternative location in Massachusetts (id. at 7). Specifically, MVRE argued that the Devens site was fatally flawed because it is 20 miles from the M&NE pipeline, and that the "0" rating which the site received for zoning/land use demonstrates that the Company knew that the Devens site was not zoned properly for a generating facility (Tr. 3, at 327, 383, 384; MVRE

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[14] Mr. David Grogan, witness for the Company, later indicated that the Devens site is only one-half mile from a potential electric interconnect (Tr. 2, at 200).

[15] The Company cited as evidence for community support the results of a May 1998 referendum in which a majority of Dracut voters accepted a proposal to allow power plants in Dracut by special permit and rejected a proposal to ban power plants outright (Exh. NHE-1, at 2-8; Tr. 2, at 218; see Dracut Brief at 1). The Company also cited the zoning of the parcel as evidence for community support (Tr. 2, at 240).

Motion to Compel, November 6, 1999). Finally, MVRE challenged the adequacy of Nickel Hill's description of the site selection process on the grounds that the Company did not provide land acquisition costs for the various alternative sites (Tr. 3, at 347, 349).

Ms. Watts, MPH, witness for MVRE, objected to siting the proposed facility in the Merrimack Valley on the grounds that the region is burdened with health concerns and air polluting industries (Exh. MVRE-DC-4). Bruton/Vrountas argued that the Merrimack Valley has high rates of respiratory disease, heart disease, and incidence of certain cancers (Bruton/Vrountas Brief at 5). Bruton/Vrountas further argued that the Greater Lawrence area has a history of poor enforcement of air regulations, and suggested that the Merrimack Valley was a poor selection for a power plant site due to the various existing health conditions in the area (id. at 9, 13-16).

The Town of Dracut argued that the Company has selected an appropriate site for its facility, citing nine findings drawn from the Dracut Special Permit and Site Plan Approval ("Special Permit") (Dracut Brief at 3, 4).[16] Dracut also argued that Siting Board regulations do not require any particular level of consideration of alternate sites (id. at 4).

Nickel Hill maintained that the selection of an appropriate site contributes to the minimization of environmental impacts (Exh. EFSB-SS-2, at 1). The Company asserted that environmental impacts are minimized by selecting a location close to suitable gas lines, electric lines, and water, since short interconnections would have fewer impacts than long interconnections (id.). The Company argued that impacts are further minimized by selecting a large and/or well-buffered site, which reduces potential noise and visual impacts on neighbors and which gives flexibility in facility layout, allowing a design that can avoid wetlands and take best advantage of buffer areas (id.). The Company asserted that based on these criteria, the location and size of the 450-acre Brox properties is "nearly ideal," and concluded that the process leading to the selection of the Dracut site therefore minimizes environmental impacts (id.).

In response to MVRE's argument that the Merrimack Valley is not a suitable location for a generating facility, the Company provided information on point source emissions within

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[16] The nine findings address zoning, permitting, site buffering, mix of neighboring land use, distance to residences, distance to sensitive receptors, and compatibility with existing use (Exh. EFSB-G-13(d), Att.).

Massachusetts to support its assertion that the Merrimack Valley area does not have a disproportionate number of major emissions sources or a disproportionate share of total emissions (Exh. EFSB-SS-5).[17]

In response to MVRE's contentions regarding the Devens site, Nickel Hill asserted that neither G. L. c. 164, § 69J¼ nor any Siting Board decision interpreting that statute requires an applicant to consider an alternate site, within or outside the Commonwealth, and noted that the Restructuring Act of 1997 specifically removed the requirement to review and notice alternate sites (Nickel Hill Reply Brief at 20-21). The Company also indicated that "it took some time to evaluate whether gas could be brought to this site in an economical, reliable and least environmental impact manner" (Tr. 3, at 385). The Company added that it had originally hoped to share the cost of building an appropriately-sized gas transmission service to Devens, but that this likelihood eventually appeared to be small (Tr. 3, at 389, 390). The Company indicated that the "0" rating of the Devens site for zoning and land use was in fact a neutral rating that reflected, in part, unclear resolution of zoning issues in discussions with the Devens Commerce Commission (Tr. 3, at 322). In response to MVRE's land acquisition cost arguments, the Company argued that the cost of alternative sites falls outside the Siting Board's jurisdiction, and that land acquisition costs did not figure into the Company's site selection evaluation (Tr. 3, at 347).

D. Analysis

Nickel Hill has presented a site selection process which resulted in a decision by Constellation to pursue development of a generation facility on a portion of the Brox properties in Dracut. Nickel Hill provided information on six potential sites for generating facilities in New

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[17] Choosing NO_X as an indicator, the Company determined that eleven of the top 100 Massachusetts NO_X sources are within the Merrimack Valley Air Pollution Control District ("APCD"), and that these eleven account for only 6 percent of stationary source NO_X emissions, statewide; in contrast, the Southeastern Massachusetts APCD accounts for 46 percent of the stationary source NO_X emissions from the Commonwealth's 100 largest emitters (Exh. EFSB-SS-5). The Company also determined that none of the top five NO_X sources in Massachusetts are located in the Merrimack Valley APCD (id.).

England, and described the sites' suitability with respect to a number of criteria concerning existing infrastructure and land uses that could influence environmental and community impacts. The Siting Board notes that the Company provided information on the six sites, developed based on site visits, environmental analyses specific to each site, and consideration of economic factors and reliability.

MVRE implicitly argued that Nickel Hill's description of its site selection process is not accurate, contending that the Devens site was not actually given serious consideration. MVRE also argued that the description is not complete because comparative land acquisition costs were not provided. The Siting Board notes that there is no indication in the record that Nickel Hill's description of its site selection process is inaccurate. The "0" or neutral rating for land use and zoning assigned to the Devens site appears to accurately reflect Constellation's determination that the zoning status of the Devens site was unclear.[18] The Siting Board also notes that neither its statute nor its regulations require proponents of generating facilities to determine and report land acquisition costs for other sites considered.[19] Accordingly, the Siting Board finds that the Company's description of the site selection process used is accurate.

MVRE has argued that Nickel Hill's site selection process was inadequate because Nickel Hill did not consider any suitable alternate location in Massachusetts. The Siting Board notes that there is no statutory or regulatory requirement that the proponent of a generating facility consider alternate sites, either within or outside of Massachusetts; G. L. c. 164 § 69J¼ requires only that the proponent accurately describe the process by which a site was selected. Moreover,

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[18] Although not a basis for the Siting Board's conclusion, documents examined in camera by the Hearing Officer contain legal analysis prepared by Nickel Hill's counsel regarding the zoning considerations of the Devens site, which analysis does not contradict the testimony of Nickel Hill's witnesses. Nickel Hill Energy, LLC, 99-3 (Hearing Officer Ruling, January 14, 2000, at 4). See Exhs. NHE-1, at 2-7; EFSB-SS-1, at 6; Tr. 3, at 318-331.

[19] A generic requirement of this kind may, in fact, be inconsistent with the Siting Board's governing statute which states that it "shall not require any data related to the . . . cost of the proposed generating facility, except for data related to the costs associated with the mitigation, control or reduction of the environmental impacts of the proposed generating facility." G. L. c. 164, § 69J¼.

as discussed above, the record indicates that Constellation did in fact evaluate a second potentially viable site in Massachusetts and that it found this site to be inferior to the Dracut site in several respects.

MVRE further argued that a site selection process that results in the siting of a generating facility within the Merrimack Valley is inherently faulty, because of the prevalence of respiratory disease in the region and the presence of other pollution sources. Nickel Hill, on the other hand, asserts that its proposal minimizes environmental impacts in part through its location on a large, well-buffered site that is close to major infrastructure elements. The record indicates that Constellation identified the strengths and weaknesses of each of the six sites, and selected the Dracut site as the most advantageous. The record indicates that the chosen site has a number of attributes which would help to minimize the environmental impacts of a generating facility, including proximity to available water and to electric, gas, and sewer infrastructure, the size of the site, the existing visual buffers, existing use for mining, and distance from residential areas. The primary disadvantage of the site, as identified by the intervenors, is its location in an area that has several communities with salient health status statistics and a history of air emissions compliance issues.

The Siting Board recognizes that an analysis of local air quality impacts is critical to the evaluation of a petition to construct a generating facility. However, this analysis must be based on a rigorous evaluation of the emissions of the specific facility proposed at the specific site; the Siting Board cannot conclude a priori that an entire region such as the Merrimack Valley is an unsuitable location for any type of generating facility.[20] The Siting Board therefore rejects the notion that Constellation's site selection process is inherently flawed. On balance, based on the significant advantages of the site across a broad range of criteria, the Siting Board finds that the Company's site selection process resulted in the selection of a site that contributes to the minimization of environmental impacts and the costs of mitigating, controlling, and reducing such impacts.

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[20] Descriptions of baseline air quality and baseline health status are provided below in Section III.B.2 and Section III.L.1, respectively.

III. ENVIRONMENTAL IMPACTS

A. Standard of Review

G. L. c. 164, § 69J¼ requires the Siting Board to determine whether the plans for construction of a proposed generating facility minimize the environmental impacts of the proposed facility consistent with the minimization of costs associated with the mitigation, control, and reduction of the environmental impacts of the proposed generating facility. In order to make this determination, the Siting Board assesses the impacts of the proposed facility in eight areas prescribed by its statute, including air quality, water resources, wetlands, solid waste, visual impacts, noise, local and regional land use, and health, and determines whether the applicant's description of these impacts is accurate and complete. G. L. c. 164, § 69J¼.

The Siting Board also assesses the costs and benefits of options for mitigating, controlling, or reducing these impacts, and determines whether mitigation beyond that proposed by the applicant is required to minimize the environmental impacts of the proposed facility consistent with the minimization of costs associated with the mitigation, control, and reduction of the environmental impacts of the proposed generating facility. Compliance with other agencies' standards does not establish that a proposed facility's environmental impacts have been minimized.

Finally, the Siting Board assesses any tradeoffs that need to be made among conflicting environmental impacts, particularly where an option for mitigating one type of impact has the effect of increasing another type of impact. An assessment of all impacts of a facility is necessary to determine whether an appropriate balance is achieved both among conflicting environmental concerns and between environmental impacts and cost. A facility proposal which achieves this balance meets the Siting Board's statutory requirement to minimize environmental impacts consistent with minimizing the costs associated with the mitigation, control, and reduction of the environmental impacts of the proposed generating facility.

B. Air Quality

This section describes the emissions and impacts of the proposed facility, compliance with existing regulations, and emission offsets proposed by the Company.

1. Applicable Regulations

The Company stated that the principal air quality regulatory programs that apply to the proposed facility are the Massachusetts Air Plan Approval program, Non-Attainment Review, and U.S. Environmental Protection Agency ("EPA") Prevention of Significant Deterioration requirements; all three programs are administered by the Massachusetts Department of Environmental Protection ("MADEP") (Exhs. EFSB-A-2-S, Att. at 3-1; RR-EFSB-68(a), Att. at 3-1rev). Specific regulations include the National Ambient Air Quality Standards ("NAAQS");[21] New Source Review ("NSR") requirements; Prevention of Significant Deterioration ("PSD") requirements; and New Source Performance Standards ("NSPS") for criteria pollutants (Exhs. NHE-2, at 5.2-1; RR-EFSB-68(a), Att. at 3-1rev). The Company indicated that all areas of the country are classified as "attainment," "non-attainment," or "unclassified" with respect to NAAQS for six criteria pollutants: nitrogen dioxide ("NO_2"), sulfur dioxide ("SO_2"), particulates ("PM_{10}"), CO, ground level ozone, and lead (Exhs. NHE-2, at 5.2-3; EFSB-A-2-S, Att. at 3-4). According to the Company, the proposed facility is subject to NSR for precursors of ozone, which is considered a non-attainment criteria pollutant (Exh. EFSB-A-2-S, Att. at 3-1; see Table 1, below); PSD applies to major new sources of criteria pollutants (id. at 3-2; see Table 1, below); and NSPS apply to pollutants on the basis of process or source category (id. at 3-5).

The Company stated that Massachusetts regulations for air plan approval require Best Available Control Technology ("BACT")[22] for each regulated pollutant (Exhs. NHE-2, at 5.2-5; EFSB-A-2-S, Att. at 3-6). In addition, the Company stated that the facility is required to have

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[21] In addition, MADEP has adopted the NAAQS limits as Massachusetts Ambient Air Quality Standards (Exh. EFSB-A-2-S, Att. at 3-3).

[22] The Company stated that "BACT" is defined in the PSD regulations as "an emissions limitation . . . based on the maximum degree of reduction for each pollutant subject to regulation . . . which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental and economic impacts and other costs, determines is achievable . . . through application of production processes or available methods, systems and techniques . . . for control of such pollutant." (Exh. EFSB-A-2-S, Att. at 4-16).

Lowest Achievable Emissions Rate ("LAER")[23] technology for VOC and NO_X, which are regulated as precursors to ozone by MADEP (Exh. EFSB-A-2-S, Att. at 3-1). The Company stated that the Technology Performance Standard ("TPS") established by the Siting Board requires new facilities either to demonstrate that emissions comply within the TPS emissions criteria or to provide data enabling the Siting Board to determine whether the proposed facility will contribute to a reliable, low-cost, diverse, regional energy supply with minimal environmental impacts (Exh. NHE-1, at 3-1). The Company stated that, under the Acid Rain Program, the EPA requires owners of new plants to acquire SO_2 emission allowances to offset their potential to emit SO_2 (id. at 4.2-8; Exh. NHE-2, at 5.2-5).

The Company described several other air quality requirements including a MADEP prohibition on dust or odor-causing emissions from construction or operation of a fossil-fuel plant, an additional limitation on particulate matter emissions from new fossil-fuel facilities in Massachusetts, and the MADEP air toxics policy (Exh. EFSB-A-2-S, Att. at 3-7, 3-8).[24]

2. Baseline Air Quality

The Company provided an assessment of regional air quality, based on MADEP measurements of air quality. The Company provided data from MADEP air quality monitoring stations in Lowell, Lawrence, and Lynn, asserting that these stations were most representative of air quality in Dracut (Exh. EFSB-A-2-S, Att. at 5-12). The Company presented SO_2, NO_2, CO, PM_{10}, and ozone data from these air monitoring stations for 1995, 1996, and 1997 (id. at 5-13; Exh. RR-EFSB-42). The Company indicated that these air quality measurements were below NAAQS concentrations each year for these four criteria pollutants, but that some CO levels and

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[23] The Company stated that EPA defines "LAER" as "the most stringent emission limitation contained in the implementation plan of any State for such class or category of source, or the most stringent limitation achieved in practice by such class or category of source." (Exh. EFSB-A-2-S, Att. at 4-1).

[24] The Company also described the MADEP short-term ambient NO_2 policy applicable to sources emitting over 250 tons per year of NO_2; however, the Company stated that the proposed facility would not be subject to the policy because the NO_2 emissions would be less than this emissions threshold (Exh. EFSB-A-2-S, Att. at 3-3, 3-8).

all highest annual ozone levels were more than 50 percent of NAAQS (Exhs. EFSB-A-2-S, Att. at 5-13, 5-14; EFSB-42).[25, 26] From a regulatory standpoint, the Company indicated that the Dracut area was "in attainment" or "unclassified/attainment" for SO_2, NO_2, CO, total suspended particulates/PM_{10}, and lead, and discussed the attainment status of ozone (Exhs. INT-MVRE-G-7(a), Att. at 5.1-1; RR-EFSB-68(a), Att. at 3-5).[27]

3. Proposed Facility Emissions

The Company stated that the proposed facility would use "G" series combined-cycle combustion turbines and would burn only natural gas; pollution control would include SCR for NO_X control and an oxidation catalyst for CO (Exh. INT-MVRE-G-7(a), Att. at 2-23, 3-10,

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[25] The Company indicated that much of the relatively high measured CO concentration in ambient air is likely attributable to automobile traffic (Tr. 10, at 1288).

[26] The Company subsequently provided air quality data for 1997, 1998, and 1999 from MADEP monitoring stations in Lowell, Lawrence, and Lynn; the latter data indicated that concentrations of CO, NO_2, SO_2, and PM_{10} were all less than 50 percent of the respective standards in 1997, 1998, and 1999 (Exh. RR-EFSB-68(a), Att. at 5-13).

[27] The Company indicated that while the highest 1-hour ozone level measured in Massachusetts in each of the years 1995, 1996, 1997, and 1998 exceeded the ambient air standard of 0.12 ppm, the highest measurements at the MADEP Lawrence monitoring station were below that standard (Exh. RR-EFSB-42). The Company indicated furthermore that there were no exceedances of the 1-hour ozone standard at the Lawrence monitoring station in the ten-year period, 1989 to 1998 (Exh. INT-MVRE-G-7(a), Att. at 5.9-3). However, the Company stated that until mid-1999, the entire Commonwealth had been classified as nonattainment for ozone, on the basis of the 1-hour ozone standard (Exh. RR-EFSB-68(a), Att. at 3-1rev). EPA's new 8-hour ozone standard was remanded to EPA on May 14, 1999, but not vacated (id.). On June 9, 1999, the EPA determined that the 1-hour standard had been attained and also no longer applied to eastern Massachusetts, including Dracut (id.; Exh. RR-EFSB-42). On October 22, 1999, MADEP reinstated requirements for continued NSR for major sources of ozone precursors, equivalent to the requirements for a "serious" non-attainment zone (Exh. RR-EFSB-68(a), Att. at 3-1rev. 3-5). On July 20, 2000, the EPA rescinded its previous finding that the 1-hour standard no longer applied to eastern Massachusetts, effective January 16, 2001; the State may submit a redesignation request for areas that have had no ozone violations since the revocation of the 1-hour standard (id.). The Dracut area is in attainment (or unclassified) for other criteria pollutants (Exh. NHE-2, at 5.2-4).

3-11). The Company indicated that the proposed facility would emit air pollutants including carbon dioxide ("CO_2"), NO_X, CO, VOC, particulate matter, SO_2, sulfuric acid mist, and ammonia (Exhs. EFSB-A-2-S, Att. at 3-2, 4-20; RR-EFSB-46). The Company tabulated maximum potential annual emissions of specific pollutants for the proposed facility, and compared these maximum emissions against non-attainment NSR threshold criteria and PSD significant emission rates (Exh. EFSB-A-2-S, Att. at 3-2). Table 1, below, shows maximum annual emissions in tons per year ("tpy"), as calculated by the Company.

Table 1
Potential Annual Emissions to Air

Pollutant [a]	Maximum Potential Emissions (tpy) [b,c]	NSR Threshold Criteria (tpy) [d]	PSD Significant Emission Rate (tpy) [e]
Carbon dioxide (CO_2)	2,278,663 [f]	N/A	N/A
Nitrogen oxides (NO_X/NO_2)	157	50	40
Carbon monoxide (CO)	309	N/A	100
Volatile organic compounds (VOC)	98 (81) [g, h]	50	40
Total particulates	111	N/A	15
PM_{10}	111	N/A	25
Sulfur dioxide (SO_2)	65 (48) [g]	N/A	40
Sulfuric acid mist (H_2SO_4)	29 (21) [g]	N/A	7
Lead (Pb)	<0.3	N/A	0.6

Values that exceed applicable criteria, thus triggering certain regulatory requirements, are underlined.
N/A Not applicable

a. PSD pollutants and CO_2. No emissions are expected for these additional PSD pollutants: asbestos, beryllium, mercury, vinyl chloride, fluorides, hydrogen sulfide, total reduced sulfur, reduced sulfur compounds, chlorofluorocarbons, halons, and ozone depleting substances (Exh. EFSB-A-2-S, Att. at 3-2).
b. Annual potential to emit from new units at 8,760 hours per year or with an allowance for start-ups, in tons per year (Exh. EFSB-A-2-S, Att. at 3-2).
c. See Exh. EFSB-A-2-S, Att. at 3-2 for additional notes.
d. Non-attainment New Source Review thresholds apply to VOC and NO_X as ozone precursors; the proposed facility is subject to LAER for these pollutants (Exhs. EFSB-A-2-S, Att. at 3-1; RR-EFSB-68(a), Att. at 3-1rev).
e. Prevention of Significant Deterioration review requires BACT for each pollutant that meets PSD significance criteria (Exh. EFSB-A-2-S, Att. at 3-3).
f. Carbon dioxide emissions data are from Exh. RR-EFSB-46.
g. Values in parentheses were provided in the Company's air plan revisions (Exh. RR-EFSB-68(a), Att. at 3-2), which were provided after the close of hearings.
h. The anticipated maximum potential emissions of VOC as given in the FEIR, 98 tpy, was revised in the SFEIR, dated May 31, 2000, to 71 tpy, which number was also quoted in hearings on August 15, 2000 (Exhs. INT-MVRE-G-7(a), Att. at 3-11; INT-MVRE-G-7(d), Bulk Att. at 3-13; Tr. 19, at 2429). The same value of 98 tpy, given in the Air Plan Approval Application, was changed in the air plan revisions, dated August 24, 2000, to a value of 81 tpy (Exhs. EFSB-A-2-S, Att. at 3-2; RR-EFSB-68(a), Att. at 3-1, 3-2). The evidentiary record does not resolve the difference between the values of 71 tpy and 81 tpy. However, the Company has since indicated that it provided the value of 71 tpy in error (Nickel Hill Supplemental Reply Brief at 5, n.4).

4. Emissions Control and Monitoring

The Company stated that non-attainment NSR review for two ozone precursors – VOC and NO_X – is required because the new units would emit VOC and NO_X above NSR thresholds of 50 tpy (Exh. EFSB-A-2-S, Att. at 3-1). The Company stated that LAER would be achieved for NO_X and VOC, and that BACT would be incorporated for CO, SO_2, PM_{10}, and other pollutants (id. at 3-6, 3-7, 4-16). The Company indicated that there are some trade-offs in reducing emissions of various pollutants; as examples, reducing NO_X emissions by reducing the flame temperature tends to increase VOC and CO emissions, and increases in emission of added ammonia ("ammonia slip") occur as NO_X emissions are controlled with an SCR system (id. at 4-16; Exh. EFSB-A-3; Tr. 19, at 2493).

The Company identified 2 parts per million ("ppm") as LAER for NO_X and indicated that 2 ppm would be achieved with a dry low-nitrogen oxides combustion system with SCR (Exhs. INT-MVRE-G-7(a), Att. at 3-10; INT-MVRE-G-7(d), Bulk Att. at 3-11; RR-EFSB-68(a), Att. at 2-1).[28] The Company stated that the SCR system uses aqueous ammonia (19 percent ammonia in water, by weight) to react with NO_X in the turbine exhaust gas over a catalyst to form nitrogen gas and water (Exh. EFSB-A-2-S at 2-1, 4-2).[29] The Company noted that, based on the 2 ppm NO_X emission rate attainable with SCR, it anticipated a facility permit limit for NO_X of 157 tpy (id. at 3-2; Exh. RR-EFSB-68(a), Att. at 3-2).[30]

The Company also evaluated XONON and $SCONO_X$, two NO_X control technologies that do not require the addition of ammonia (Exh. EFSB-A-2-S, Att. at 4-3; Tr. 10, at 1261). The Company stated that XONON technology uses flameless low-temperature catalytic combustion

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[28] The stated emission concentration for NO_X is 2 ppm dry volume basis, corrected to 15 percent oxygen (Exh. RR-EFSB-68(a), Att. at 3-5).

[29] The Company indicated that achieving a NO_X level of 2 ppm while minimizing ammonia slip would be facilitated by using 50 percent more catalyst than would normally be recommended for the facility (Exh. EFSB-A-1; Tr. 10, at 1273).

[30] A slightly different figure, 156 tpy, is given by the Company in the SFEIR (Exh. INT-MVRE-G-7(d), Bulk Att. at 3-13). The Siting Board notes that the difference in the numbers is inconsequential for purposes of Siting Board review.

of natural gas to reduce NO_X emissions, but has not been demonstrated to achieve 2 ppm and is not commercially available (Exhs. EFSB-A-2-S, Att. at 4-3; RR-EFSB-68(a), Att. at 4-3). The Company provided information indicating that $SCONO_X$ uses an oxidation catalyst and a potassium carbonate coating to absorb NO_2, followed by periodic regeneration of the potassium carbonate with hydrogen and CO_2 in the absence of oxygen (Exh. INT-MVRE-G-7(d), Bulk Att., Appendix A of Appendix E). The Company provided a press release indicating that ABB Alstom Power was marketing $SCONO_X$ for natural gas-fired combined-cycle combustion turbines of any size (Exh. INT-MVRE-G-7(b)). The Company indicated that ammonia and PM_{10} emissions might be reduced with a $SCONO_X$ system and added that SO_2 could also be reduced (Exh. INT-MVRE-G-7(d), Bulk Att., Appendix E at 12; Tr. 19, at 2415). However, the Company asserted that $SCONO_X$ has not been demonstrated to reliably meet 2 ppm NO_X on large power plants (Exhs. EFSB-A-2-S, Att. at 4-5, 4-7; INT-MVRE-G-7(d), Bulk Att. at 4-7; RR-EFSB-68(a), Att. at 4-5; Tr. 10, at 1260), requires substantial maintenance which would require periodic shut-downs (Exhs. INT-MVRE-G-7(d), Bulk Att. at 5-7; RR-EFSB-68(a), Att. at 4-6), would have a capital cost of approximately $73,600,000, as compared to $13,900,000 for SCR (Exh. INT-MVRE-G-7(d), Bulk Att. at 5-6), and would cost approximately $11,600,000 more per year than SCR (including annualized capital and operating costs but not costs of excess downtime) (id. at 5-7). The Company noted that in each of three recent air plan approvals for combined-cycle power plants, MADEP has concluded that SCR is the most cost-effective means of achieving BACT/LAER emission rates for NO_X (id. at 5-5, 5-6). The Special Permit includes provisions that may require the Company to revisit the issue of using $SCONO_X$.[31]

The Company identified 1 ppm as LAER for VOC and indicated that the limit of 1 ppm would be achieved by working closely with the turbine vendor that is selected (Exhs. INT-

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[31] The Special Permit requires the Company to install an alternative technology designed to reduce or eliminate the use of ammonia under specified conditions which include consideration of availability, reliability, and total costs (not to exceed $1,000,000 compared to maintaining the SCR system); such conditions are to be evaluated every other year for 15 years (Exh. EFSB-G-13(d), Att. at 18).

MVRE-G-7(d), Bulk Att. at 2-9; RR-EFSB-68(a), Att. at 3-2, 4-15; Tr. 19, at 2380-2382).[32]

With regard to CO, the Company stated that a dry low-NO_X combustion turbine generates CO at a somewhat higher rate than a conventional low-NO_X combustion turbine (Exhs. NHE-2, at 5.2-7; EFSB-A-2-S, Att. at 4-16). The Company stated that it would use a passive oxidation catalyst as an add-on control for CO, thereby limiting CO emissions to 2 ppm when operating at a load of 75 percent or more (Exh. EFSB-A-2-S, Att. at 4-17, 4-18).[33]

With regard to SO_2, the Company stated that the only practical means for controlling SO_2 emissions is to limit the sulfur content of the fuel; the Company proposed to limit sulfur in the gas to 1.07 grains per 100 standard cubic feet, and asserted that use of natural gas as the only fuel is BACT for the project (id. at 4-18).[34] While the Company has proposed to use no backup fuel, a diesel generator is proposed to provide emergency electrical power for the plant in the event of losing grid power (Tr. 15, at 1878-1879). The Company stated that the projected maximum SO_2 emissions would not be exceeded due to emergency use of the generator (Exh. EFSB-A-2-S, Att. at 3-2).

With regard to particulate matter, the Company stated that BACT would be achieved by the use of natural gas and advanced combustion turbine technology, and by limiting ammonia slip to 2 ppm (or 58 tpy) (Exhs. NHE-2, at 5.2-7; INT-MVRE-G-7(d), Bulk Att. at 2-6, 5-4; RR-EFSB-68(a), Att. at 2-1, Appendix D at 11). The Company indicated that add-on stack emissions controls for particulate matter would not be feasible, given the high exhaust flow rates and low exhaust concentrations of particulates (Exh. EFSB-A-2-S, Att. at 4-18). The Company does propose to use high efficiency drift eliminators to limit drift from the wet mechanical cooling tower, and to use mist eliminators to control oil mist from lube oil vents on the turbines and

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[32] The stated emission concentration for VOC is 1 ppm, dry volume basis, corrected to 15 percent oxygen (Exh. RR-EFSB-68(a) Att. at 4-15).

[33] The Company proposes to limit CO emissions to 2 ppm, dry volume basis, corrected to 15 percent oxygen (Exh. EFSB-A-2-S at 4-17, 4-18).

[34] The limit for sulfur in gas was subsequently lowered in the air plan revisions from 1.07 grains per 100 standard cubic feet to 0.8 grains per 100 standard cubic feet (Exhs. EFSB-A-2-S, Att. at 4-18; RR-EFSB-68(a), Att. at 4-18), with a concomitant reduction in SO_2 emissions as shown parenthetically in Table 1, above.

cooling towers (id. at 4-18, 4-19).[35]

Relative to NSPS, the Company stated that emissions of NO_X would be limited to 2 ppm and thus would be well below the nominal 75 ppm[36] NSPS for NO_X from gas turbines (Exhs. NHE-2, at 5.2-3; RR-EFSB-68(a), Att. at 3-5). The Company also stated that fuel sulfur fractions and flue gas SO_2 concentrations would be below NSPS standards (Exhs. NHE-2, at 5.2-3; RR-EFSB-68(a), Att. at 3-5).[37]

As noted above, proponents of new generating facilities must either demonstrate that the TPS thresholds are met or provide an analysis comparing the proposal to other fossil-fuel generating technologies. The Company presented tables comparing the expected facility emission rates with TPS thresholds, expressed in pounds per megawatt hour ("MWH") at 100 percent load (Exh. NHE-1, at 3-2 and 3-3). The Company stated that the facility's emissions would be below TPS thresholds for all criteria pollutants as well as all non-criteria pollutants (id. at 3-2 to 3-4). The Company presented the following data for criteria pollutants set forth in Table 2, below.

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[35] Use of drift eliminators is required by Condition IV.G of the Special Permit (Exh. EFSB-G-13(d), Att., at Appendix B)

[36] The Company stated that the NSPS is a nominal value of 75 ppm NO_X, corrected to 15 percent oxygen, with allowance for a heat rate correction for efficient turbines and a correction for fuel-bound nitrogen (Exh. RR-EFSB-68(a), Att. at 3-5).

[37] The Company stated that NSPS limits fuel sulfur content to 0.8 percent by weight and SO_2 emissions to 150 ppm (dry volume, corrected to 15 percent oxygen) (Exh. RR-EFSB-68(a), Att. at 3-5).

Table 2
Comparison to Technology Performance Standards

Pollutant	Performance Standard (pounds/MWH)	Project Emission Rate (pounds/MWH)[a]
SO_2	0.021	0.020
NO_X	0.120	0.051
PM[b]/PM_{10}	0.081	0.027
CO	0.077	0.031
VOC	0.035	0.009

Source: Exh. NHE-1, at 3-2
a. Emission rates from 100 percent base load at 50° F; some of these projected rates may have been reduced since the project was first proposed.
b. "PM" is particulate matter.

The Company stated that it would perform initial emissions stack testing, periodic re-testing, and, for NO_X, CO, and ammonia, continuous emissions monitoring (Exhs. INT-MVRE-G-7(a), Att. at 2-23; INT-MVRE-G-7(d), at 8-4; Tr. 10, at 1242).

5. Ambient Air Impacts

The Company asserted that emissions from the project would have "insignificant" effects on local air quality (Exh. NHE-2, at 5.2-34). In support of this statement, the Company presented results of both screening level and refined atmospheric dispersion modeling, which predicted project-related ground-level ambient concentrations of criteria and other pollutants (Exhs. EFSB-A-2-S, Att. at 6-1 to 6-10; INT-MVRE-G-7(a), Att. at 5.1-5, 5.1-6).[38, 39, 40] The

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[38] The Company indicated that the EPA-approved SCREEN3 dispersion model was used to predict maximum downwind ground-level concentrations from the project of NO_2, SO_2, PM_{10}, and CO within a radius of 30 kilometers (18.6 miles) (Exh. EFSB-A-2-S, Att. at 6-2, 6-7).

[39] The Company indicated that the EPA-approved Industrial Source Complex Short-Term Version 3 ("ISCST3") model was used to predict maximum time-averaged ambient

(continued...)

Company indicated that the height of the stacks was assumed to be the full good engineering practice ("GEP") height of 170 feet (Exhs. EFSB-A-2-S, Att. at 6-1; INT-MVRE-G-7(a), Att. at 5.1-5).[41] Operating conditions representing maximum impact were modeled for each criteria pollutant (Exh. INT-MVRE-G-7(a), Att. at 5.1-6). The Company then compared modeled concentrations to significant impact levels ("SILs")[42] for criteria pollutants, and MADEP Allowable Ambient Levels ("AALs") and Threshold Effects Exposure Limits ("TELs") for air toxics,[43] as shown below in Tables 3 and 4 (Exhs. EFSB-A-2-S, Att. at 6-9; RR-EFSB-68(a),

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39 (...continued)
ground-level concentrations due to the project of NO_2, sulfuric acid, ammonia, formaldehyde, and six trace metals (arsenic, cadmium, hexavalent chromium, lead, manganese, and mercury) within a radius of 20 kilometers (12.4 miles), based on five years of National Weather Service data and one year of data collected in Haverhill (Exh. EFSB-A-2-S, Att. at 6-2, 6-3, and 6-8 to 6-10).

40 Commenters in the Massachusetts Environmental Policy Act process asserted that data from Portland, Maine, and Logan Airport in Boston, supplemented by one year of data from the Merrimack Valley, were inadequate for modeling (Exh. INT-MVRE-G-7(a), Att. at section 7, comments 15.11 and 19.9). The Company responded that it is common for air analyses to use upper air data from locations distant from a site, due to the paucity of stations where the National Weather Service collects upper air data (id.). The Company stated that air impacts from the project were "insignificant" as modeled based on National Weather Service data from Logan Airport, and likewise "insignificant" as modeled on the data from the Merrimack Valley (id. at Section 7, response 15.11).

41 The Company offered its viewpoint that a GEP stack height of 170 feet achieves a balance between mitigating ground-level air impacts and visual impacts (Exh. INT-MVRE-G-7(a), Att. at 6-4, section 7.0, response 9.5; Tr. 10, at 1315-1316).

42 EPA and MADEP established SILs as an additional set of criteria for NO_2, SO_2, CO, and PM_{10} at a level of emissions from a new source or a modification to an existing source low enough so that emissions below SILs would not significantly affect modeled air quality; a detailed evaluation of compliance with the NAAQS is not required if SILs are not exceeded (Exh. EFSB-A-2-S, Att. at 1-5).

43 Massachusetts regulates non-criteria toxic air pollutants by assessing compliance with short-term exposure guidelines (maximum 24-hour impact) known as TELs and by assessing compliance with long-term exposure guidelines (averaged over one year) known as AALs. IDC Bellingham LLC, 9 DOMSB 260, at 26 (1999) ("IDC Bellingham (continued...)

Att. at 6-7, 6-8, and 6-10; INT-MVRE-G-7(a), Att. at 5.1-7, 5.1-8). Criteria pollutants were modeled for both simple and complex terrain, and were evaluated first using SCREEN3 and then using the more refined ISCST3 model for pollutants that were not screened out with the screening model (Exh EFSB-A-2-S, Att. at 6-2 to 6-9). Non-criteria pollutants were evaluated only with the more refined model (id.). Based on these comparisons, the Company predicted that facility-related ground-level ambient pollutant concentrations would not exceed SILs, AALs, or TELs (id. at 6-9; Exh. RR-EFSB-68(a), Att. at 2-5, 6-7, 6-8, 6-10).[44, 45]

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[43] (...continued)
Decision").

[44] The average annual concentration of NO_2 as projected by the screening model exceeded the SIL, but the concentration projected by the refined model was less than the SIL (Exhs. EFSB-A-2, Att. at 6-9; RR-EFSB-68(a), Att. at 6-8). Based on refined modeling, maximum concentrations from the facility would range from 0.01 percent to 97 percent of the SILs, TELs, and AALs (as calculated from Exh. EFSB-A-2, Att. at 6-9, 6-10); the latter figure of 97 percent was revised to 42 percent, based on the air plan revisions (Exh. RR-EFSB-68(a), Att. at 6-10).

[45] The Company specifically highlighted the comparison of a predicted maximum 24-hour ammonia impact of 4.9 or 5.1 $\mu g/m^3$ as being below the 24-hour TEL of 100 $\mu g/m^3$ (Exhs. INT-MVRE-G-7(a), Att. at 5.1-8; EFSB-A-2-S, Att. at 6-10). The modeled maximum 24-hour ammonia impact listed in the air plan revisions is 1 $\mu g/m^3$, which apparently differs from the previously reported value of 4.9 or 5.1 $\mu g/m^3$ (Exh. RR-EFSB-68(a), Att. at 6-10). The revised value is also below the 24-hour TEL.

Table 3
Incremental Facility Impact of Criteria Air Pollutants

Pollutant	Averaging Period	Modeled Maximum Concentration ($\mu g/m^3$)[a]	Significant Impact Levels ($\mu g/m^3$)	Operating Condition; Dispersion Model
NO_2	Annual	0.13	1	75% Load, Gas, 0°F; ISCST3, Boston 1995 meteorology, Simple terrain
		0.5		75% Load, Gas, 0°F; SCREEN3, Complex terrain
SO_2	3-Hour	3.64 / 1.80	25	75% Load, Gas, 0°F; SCREEN3, Simple / Complex
	24-Hour	1.62 / 0.80	5	75% Load, Gas, 0°F; SCREEN3, Simple / Complex
	Annual	0.32 / 0.16	1	75% Load, Gas, 0°F; SCREEN3, Simple / Complex
PM_{10}	24-Hour	3.5 / 1.8	5	75% Load, Gas, 0°F; SCREEN3, Simple / Complex
	Annual	0.7 / 0.4	1	75% Load, Gas, 0°F; SCREEN3, Simple / Complex
CO	1-Hour	115.0 / 57.7	2000	50% Load, Start-up, 0°F; SCREEN3, Simple / Complex
	8-Hour	80.5 / 40.4	500	50% Load, Start-up, 0°F; SCREEN3, Simple / Complex

Sources: Exhs. INT-MVRE-G-7(a) at 5.1-7; EFSB-A-2, at 6-7 to 6-9; RR-EFSB-68(a), Att. at 6-7, 6-8.

a. Where two values are provided, they are from simple and complex terrain modeling, respectively. Listed concentrations were calculated using the SCREEN3 program, except annual average NO_2 concentrations, which were recalculated using the more refined ISCST3 model.

Table 4
Incremental Facility Impact of Air Toxics

Pollutant	Averaging Period	Modeled Maximum Concentration ($\mu g/m^3$)	MADEP Guideline ($\mu g/m^3$) [a]	Operating Condition; Dispersion Model
Sulfuric acid	24-Hour	0.38	2.72	75% Load, Gas, 0°F; ISCST3
	Annual	0.02	2.72	75% Load, Gas, 0°F; ISCST3
Ammonia	24-Hour	1.0	100	75% Load, Gas, 0°F; ISCST3
	Annual	0.05	100	75% Load, Gas, 0°F; ISCST3
Formaldehyde	24-Hour	0.14	0.33	75% Load, Gas, 0°F; ISCST3
	Annual	0.007	0.08	75% Load, Gas, 0°F; ISCST3
Arsenic	24-Hour	<0.0000181	0.0005	75% Load, Gas, 0°F; ISCST3
	Annual	<0.000000818	0.0002	75% Load, Gas, 0°F; ISCST3
Cadmium	24-Hour	<0.000311	0.003	75% Load, Gas, 0°F; ISCST3
	Annual	<0.0000140	0.001	75% Load, Gas, 0°F; ISCST3
Hexavalent chromium	24-Hour	<0.000481	0.003	75% Load, Gas, 0°F; ISCST3
	Annual	<0.0000217	0.0001	75% Load, Gas, 0°F; ISCST3
Lead	24-Hour	<0.00592	0.14	75% Load, Gas, 0°F; ISCST3
	Annual	<0.000267	0.07	75% Load, Gas, 0°F; ISCST3
Manganese	24-Hour	<0.000592	N/A	75% Load, Gas, 0°F; ISCST3
	Annual	<0.0000267	N/A	75% Load, Gas, 0°F; ISCST3
Mercury	24-Hour	<0.000163	0.14	75% Load, Gas, 0°F; ISCST3
	Annual	<0.00000734	0.07	75% Load, Gas, 0°F; ISCST3

Source: Exh. RR-EFSB-68(a), Att. at 6-10.
a. 24-hour TELs and annual AALs.
< Less than listed value. Emission factor based on one-half the detection limit, as cited from EPA draft emission factors (see Exh. EFSB-A-2, Att. at 4-20).
N/A Not available

The Company also presented a comparison of expected ambient SO_2 concentrations to vegetation sensitivity threshold values (Exh. EFSB-A-2-S, Att. at 6-12). A representative annual average background concentration of SO_2, obtained from a Lawrence monitoring station,

18.3 $\mu g/m^3$, is above the annual average vegetation sensitivity threshold of 18 $\mu g/m^3$; addition of a "very small" contribution of SO_2 (0.4 $\mu g/m^3$) by the proposed project would raise the maximum predicted concentration plus background to 18.7 $\mu g/m^3$, according to the Company (Exh. EFSB-A-2-S, Att. at 6-13; Tr. 10, at 1264).[46] The Company indicated there would not be damage to vegetation from salts present in water drawn from the Merrimack River that would be concentrated by evaporation in the cooling towers, emitted in drift, and deposited on land at an estimated rate of 1 to 10 pounds per acre per year within a half-mile radius of the facility (Tr. 10, at 1213).

The Company reported on results of its interactive source modeling for SO_2, NO_X, PM_{10}, and CO, which provide the sum of ambient concentrations as measured at representative MADEP monitoring locations ("background") added onto concentrations modeled for 29 facilities within a radius of 10 miles, including the subject facility (Exhs. NHE-2, at 5.2-24 to 5.2-28; INT-MVRE-G-7(a), Att. at 5.1-9 to 5.1-13).[47, 48] Modeling results are summarized below in Table 5. The results indicate that the proposed facility would increase cumulative concentrations by no more than one-half of one percent ($\leq$0.5 percent) for these criteria pollutants at the locations of maximum impacts from combined sources (Exh. INT-MVRE-G-7(a),

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[46] Subsequent data presented by the Company indicate a background concentration of 21.0 $\mu g/m^3$, which combined with a revised facility contribution of 0.3 $\mu g/m^3$, gives a total of 21.3 $\mu g/m^3$, which exceeds the listed vegetation sensitivity concentration of 18 $\mu g/m^3$ (Exh. RR-EFSB-68(a), Att. at 6-13). The Company also stated that secondary NAAQS are intended to protect public welfare from effects including damage to vegetation, and indicated that the only secondary standard for SO_2 is 1300 $\mu g/m^3$, for a 3-hour average concentration (Exhs. NHE-2, at 5.2-2; EFSB-H-2).

[47] The 29 facilities include the proposed Nickel Hill facility (two stacks), MA Refusetech in North Andover (two stacks), Ogden Haverhill (two stacks), the Ogden LTF boiler in Lawrence, Newark Atlantic Paper in Lawrence, Brox Industries in Dracut (two stacks), and additional sources in Billerica, Wilmington, Tewksbury, Lowell, Lawrence, North Andover, and Methuen (Exhs. NHE-2, at 5.2-27; INT-MVRE-G-7(a), Att. at 5.1-12).

[48] The Company indicated that it has also prepared preliminary maps from supplemental dispersion modeling of eight selected facilities in the area, and agreed to provide additional air modeling runs for the Merrimack Valley region to the Massachusetts Department of Public Health (Exhs. INT-MVRE-G-7(d), Bulk Att. at 7-1, 7-2; RR-MVRE-30; Tr. 19, at 2371).

Att. at 5.1-13).[49] The Company concluded that maximum combined concentrations from the proposed facility, interactive sources, and background are all below the NAAQS for the modeled criteria pollutants (id. at 5.1-13).[50]

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[49] Percentage is based on Siting Board staff calculation from cited exhibits.

[50] The cumulative impact concentration for 24-hour SO_2 was 92 percent of the standard at the point of maximum cumulative impact, at which the contribution from Nickel Hill was less than 0.001 percent (Exh. INT-MVRE-G-7(a), Att. at 5.1-13). The cumulative impact concentration for annual SO_2 was 76 percent of the standard at the point of maximum cumulative impact, at which the contribution from Nickel Hill was approximately 0.02 percent (id.). The cumulative impact concentration for 8-hour CO was 91 percent of the standard at the point of maximum cumulative impact, at which the contribution from Nickel Hill was approximately 0.5 percent and measured background constituted 99.5 percent (id.). The maximum combined concentrations range from 39 percent to 57 percent of the NAAQS for SO_2, NO_2, PM_{10}, and CO for the other specified averaging periods (id.) (Apportionment calculations by Siting Board staff).

Table 5
Cumulative Impact of Criteria Air Pollutants

Pollutant	Averaging Period	Nickel Hill Contribution ($\mu g/m^3$)[a]	Cumulative Impact ($\mu g/m^3$)[a]	NAAQS ($\mu g/m^3$)	Percent of Standard	Principal Contributor [b]
NO_X	Annual	0.034	49.7	100	50	Background is 61%
SO_2	3-Hour	0.000	700.9	1300	54	Indust/Instit is 79%
	24-Hour	0.000	334.4	365	92	Indust/Instit is 74%
	Annual	0.014	61.0	80	76	Indust/Instit is 70%
PM_{10}	24-Hour	0.000	76.6	150	51	Indust/Instit is 51%
	Annual	0.023	19.7	50	39	Background is 76%
CO	1-Hour	0.132	22,639.4	40,000	57	Background is 99.4%
	8-Hour	41.312	9089.4	10,000	91	Background is 99.5%

Source: Exh. INT-MVRE-G-7(a) at 5.1-13
a. Nickel Hill contribution to concentration at point of maximum cumulative concentration.
b. Principal contributor to maximum concentration ("Background" is monitored background; "Indust/Instit" includes all modeled sources except Nickel Hill and three incinerators, i.e., 25 industrial and institutional sources within 20 kilometers of Nickel Hill), each expressed as a percentage of the total predicted cumulative impact for that pollutant and averaging time, as calculated by Siting Board staff.

The Company stated that in addition to direct emissions offsets, the project will result in net decreases in New England regional emissions by displacement of power generation from older generating facilities (Exhs. INT-MVRE-G-7(a), Att. at 5.1-1; INT-MVRE-G-7(d), Bulk Att. at 3-28; Tr. 1, at 133 to 135; see also Exh. EFSB-A-10-S(a)). The Company provided a displacement analysis indicating that the proposed facility has the potential to reduce regional emissions of CO_2, NO_X, and SO_2 by substituting for power from existing plants (Exh. EFSB-A-10). The Company asserted that the project could reduce regional emissions of NO_X and SO_2 by quantities on the order of 8,000 tpy and 30,000 tpy, respectively, assuming continuous full load operation of the proposed facility (Exhs. INT-MVRE-G-7(d), Bulk Att. at 3-28; EFSB-A-10, at 2). The Company estimated a net reduction in the emission of CO_2 of 2,510,000 tpy under continuous full load (Exh. EFSB-A-10, at 2). As projected by the Company, emissions of these three air pollutants from the proposed facility would be half or less than half of the

emissions displaced from other generators, leading to a substantial regional benefit (id.).[51]

The Company indicated it would control dust during construction by paving or gravelling areas with heavy traffic, wetting exposed surfaces, sweeping up dust, and revegetating disturbed areas (Exh. EFSB-H-3). Conditions V.M and V.W of the Special Permit require these types of dust mitigation measures (Exh. INT-MVRE-G-7(a), Att. at Appendix B-25, 26).

6. Offset Proposals and Marketable Allowances

The Company stated that, pursuant to MADEP's New Source Review regulations, it would be required to obtain offsets for the proposed facility's VOC and NO_X emissions at a ratio of 1.26 to 1 (Exhs. NHE-1 at 4.2-1; EFSB-A-4-S; RR-EFSB-68(a), Att. at 3-1rev; INT-MVRE-G-7(a), Att. at 2-15, 5.1-1, 5.1-3).[52] The Company indicated its intention to obtain some or all of the required VOC and NO_X offsets from sources within the Merrimack Valley (Exhs. EFSB-A-2-S, Att. at 3-2; INT-MVRE-G-7(a), Att. at 2-15; INT-MVRE-G-7(d), Bulk Att. at 3-13; EFSB-A-4-S; Tr. 10, at 1217, 1293). The Company stated more recently that it had obtained 2 tons of VOC offsets and 158 tons of NO_X offsets from a facility located in the Merrimack Valley (Exhs. INT-MVRE-G-7(a), Att. at 2-15, 2-23, 3-11; EFSB-A-4-S2; RR-EFSB-68(a), Att. at 3-1rev). The Company stated that SO_2 emission allowances are available, and would be secured for the project (Exhs. NHE-1 at 4.2-8; NHE-2, at 5.2-5).

With respect to the Siting Board requirement that a generator offset one percent of CO_2 emissions from a project, the Company proposes to obtain offsets or provide mitigation measures for a portion of the project's CO_2 emissions (Exh. NHE-2, at 5.2-8).[53]

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[51] The Company most recently projected facility emissions of 157 tpy for NO_X, which compares to an estimated displacement of 8,500 tpy of NO_X; facility emissions of 48 tpy of SO_2, compared to displacement of 30,500 tpy of SO_2; and facility emissions of 2,278,663 tpy of CO_2, compared to displacement of 4,875,000 tpy of CO_2 (Exhs. RR-EFSB-68(a), Att. at 3-2; EFSB-A-10, at 2).

[52] Based on this ratio, the corrected value for the emissions offsets required by the project is 102 tpy of VOC and 197 tpy of NO_X (Exh. RR-EFSB-68(a), Att. at 3-1rev).

[53] The Company further stated that it is considering mitigation steps accepted by the Siting (continued...)

7. Positions of the Parties

MVRE asserted that the air of the Merrimack Valley is "already extremely polluted" (MVRE Brief at 16). Bruton/Vrountas also raised concerns about baseline air quality, asserting that incinerators in the Greater Lawrence area have been out of compliance with MADEP regulations at various times, and that Merrimack Valley residents are breathing air pollutants emitted by trash incinerators that burn a substantial proportion of all trash currently burned in Massachusetts (Bruton/Vrountas Brief at 9). Nickel Hill contended that air quality in the Merrimack Valley "compares favorably with other areas in Massachusetts" (Nickel Hill Reply Brief at 41).

MVRE questioned how the Company could credibly indicate accurate numbers of annual starts and stops for the proposed facility without substantial documentation of how such numbers were calculated (MVRE Brief at 27; MVRE Reply Brief at 8). The Company indicated that the numbers presented for annual starts and stops reflected the Company's collective judgment of how the proposed plant would be dispatched under the anticipated regional business environment, rather than having been calculated from specified assumptions; the Company also indicated that it estimated high for the number of starts and stops in order to afford itself operating flexibility (Exhs. INT-MVRE-G-7(a), Att. at 2-14; DR-MVRE-62-S2; Tr. 11, at 1485).

MVRE questioned the credibility of the Company's emissions projections, asserting that emission rates presented in various Nickel Hill documents had changed over time without explanation (MVRE Brief at 17, 29). The Company generally did not dispute that there had been changes in stated emission rates over time. Mr. Barten, a witness for the Company, described the air permitting process as one in which there is some inherent tension between manufacturers, project proponents such as Nickel Hill, and regulators (Tr. 19, at 2436).

MVRE and Andover both questioned whether Nickel Hill had contractual performance guarantees from either of the possible turbine manufacturers for VOC and ammonia emission levels (Tr. 19, at 2319, 2328, 2383, 2439, 2507). The Company stated that it has obtained no

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[53] (...continued)
Board in past cases, such as funding a level equal to $1.50 per ton for one percent of the facility's CO_2 emissions (Exh. EFSB-A-11; Tr. 10, at 1328; Nickel Hill Brief at 50).

such performance guarantee(s) to date, and added that negotiation for performance guarantees from suppliers is primarily a financial risk management issue related to the Company's ability to finance the project (Tr. 19, at 2319, 2328, 2380-2381). The Company noted that the MADEP air plan approval would govern the actual emissions that are permitted from the proposed facility (Exh. EFSB-A-2, Att. at 3-1, 3-6).

Bruton/Vrountas contended that SCONO$_X$ technology could reduce emissions of VOC, particulates, and other hazardous emissions to half or less of levels for SCR technology set forth in the FEIR (Bruton/Vrountas Brief at 2).[54] In their Massachusetts Environmental Policy Act ("MEPA") comments on the FEIR, MVRE contended that ammonia slip could be eliminated, NO_X emissions would be reduced to 1 ppm, and CO, VOC, and PM_{10} would be reduced if SCONO$_X$ were selected in lieu of SCR for NO_X control (Exh. INT-MVRE-G-7(d), Bulk Att. subsection 9). MVRE also maintained that SCONO$_X$ would avoid the need to transport aqueous ammonia to the site (see Section III.H, below).

8. Analysis

Intervenors have expressed considerable concern about the air quality impacts of the proposed facility, due in large part to a belief that air quality in the Merrimack Valley is unusually poor, and that emissions from the proposed facility, combined with emissions from existing sources in the Merrimack Valley, could pose a health threat to Merrimack Valley residents. The Siting Board addresses the potential cumulative health impacts of the proposed facility in more detail in Section III.L, below. Here we consider the proposed facility's air emissions and possible mitigation options to determine whether air quality impacts would be minimized.

Nickel Hill proposes to construct a 750 MW combined-cycle generating facility, using dry low-NO_X combustion turbines with SCR as additional NO_X control technology. The record shows that the proposed facility would emit CO_2, NO_X, CO, VOC, particulate matter, SO_2, sulfuric acid mist, and ammonia; would be required to achieve LAER for NO_X and VOC; and

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[54] The SFEIR does propose reductions in ammonia slip and VOC emissions, relative to commitments proposed in the FEIR (Exh. INT-MVRE-G-7(a), Att. at 2-6, 2-9).

would be required to incorporate BACT for other pollutants including CO, SO_2, and PM_{10}. The Company has proposed additional measures to minimize emissions, specifically use of only natural gas as fuel (i.e., no oil back-up for the turbines) and selection of the full GEP stack height of 170 feet. The Company has provided the Siting Board with documentation showing that the facility will meet the Siting Board's TPS emissions criteria; consequently, the Siting Board finds that no alternative technologies assessment is required for the proposed facility.

The Company provided information on baseline regional air quality, the proposed facility's anticipated emissions, and the cumulative air quality impacts of 29 regional emissions sources including the facility. For background air quality, the Company provided 1995 to 1997 monitoring results from MADEP stations in Lawrence, Lowell, and Lynn, which were within air quality standards for SO_2, NO_2, CO, PM_{10}, and ozone. The record indicates that with a qualified exception for ozone, air quality in the region meets existing health-based standards.

The Company indicated that emissions from the proposed facility would be minimized in accordance with EPA and MADEP regulations, and provided estimates of air emissions in terms of concentration in stack gases and in terms of tonnage per year. Actual emissions from the facility would be limited by its MADEP air plan approval.

The Company used accepted air modeling protocols to assess the impacts of the proposed facility and demonstrated that air emissions from the proposed project would not cause local air quality to significantly worsen, as compared to established air quality standards. The modeling demonstrated that impacts from the proposed facility would be below SILs for all criteria emissions. The results of the cumulative air quality impact analysis show that, for the pollutants evaluated, NO_2, SO_2, PM_{10}, and CO, the maximum combined concentrations at the location of maximum impact would be below the NAAQS, which are the federal health-based standards. The maximum combined concentrations would in fact be no greater than 76 percent of the NAAQS, with the exceptions that 24-hour SO_2 levels would be 92 percent of the standard (largely due to the modeled impact of industrial and/or institutional sources) and 8-hour CO levels would be 91 percent of the standard (primarily due to high measured concentrations). In addition, the record shows that the proposed facility would represent one-half of one percent or

less to the maximum combined concentrations.[55] The modeling also demonstrated that facility-related ambient concentrations of toxic air pollutants would be within the TELs and AALs, the state health-based guidelines. The Siting Board finds that construction of the 170-foot stack, use of only gas as fuel, and compliance with BACT and LAER, as required by MADEP, would minimize local air quality impacts.

The record shows that annual average SO_2 concentrations nearby in Lawrence already exceed published criteria identified for vegetation sensitivity. Because natural gas would be the only fuel and natural gas is a low-sulfur fuel, because the additional contribution from the facility to SO_2 concentrations in Lawrence would be modest, because primary and secondary NAAQS for SO_2 are not exceeded, and because a GEP stack height has been proposed, the Siting Board concludes that concentrations of SO_2 from the proposed facility would be minimized. Therefore, the Siting Board finds that adverse effects of SO_2 on vegetation sensitivity would be minimized.

MVRE has questioned the credibility of the Company's emissions estimates, noting that the estimates have changed several times during the course of this proceeding. The Siting Board notes that changes in emissions estimates are not unexpected during the early stages of the permitting process, as a developer works with its equipment vendors to meet the information and performance requirements of this agency, the MEPA office, and MADEP; consequently, these changes, in and of themselves, do not suggest that the emissions levels currently proposed are inaccurate. Final, binding, emissions limits for the proposed facility will not be established until the MADEP issues its final air plan approval, which by statute it may not do until after the Siting Board issues its final approval. See G.L. c. 164, § 69J¼. The Siting Board therefore is obligated to act on emissions estimates which may be further refined in the MADEP air plan approval process. The Siting Board emphasizes that this decision is based on the emissions commitments made by the Company in this proceeding. If the MADEP air plan approval establishes emissions limits that are substantially different from the range of values set forth in Table 1, above, Nickel Hill would be obligated to notify the Siting Board so that the Siting Board could determine whether to inquire further into the issue.

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[55] Calculation by Siting Board staff from values presented in Table 5, above.

MVRE and Andover have argued that Nickel Hill should be required to employ an ammonia-free NO_X control technology such as $SCONO_X$, rather than SCR, which requires use of ammonia to react with NO_X in the exhaust gases. The record shows that Nickel Hill extensively evaluated alternatives to SCR for controlling NO_X, most recently in the SFEIR filed with the MEPA office on May 31, 2000. The record indicates that one such technology, $SCONO_X$, is described by its manufacturer as commercially available and is currently being offered for installation on combined-cycle generators. However, the record also shows that the SCONOx technology has not yet been demonstrated on a large-scale facility such as Nickel Hill's; that the additional capital costs, although a matter of some debate, may be as much as $60 million; and that use of the $SCONO_X$ technology may slightly increase water use, increase plant downtime for maintenance, and reduce plant efficiency. Moreover, the record shows that MADEP recently has considered the use of $SCONO_X$, as opposed to SCR, in the context of supplemental BACT analyses for three different power plants, and each time has concluded that SCR is the more cost-effective means of achieving BACT/LAER for NO_X. Given the evidence in the record of the high cost of the technology and the level of technical and economic uncertainty regarding its use in large-scale generators such as the proposed facility, the record does not support a finding that the use of $SCONO_X$ would minimize the environmental impacts of the proposed facility, consistent with minimizing the costs associated with the mitigation, control and reduction of environmental impacts. As a result, the Siting Board will not require use of such technology as a condition of this approval.

In previous decisions, the Siting Board has held that, due both to its primacy of jurisdiction and to its greater expertise in emissions control technologies, MADEP is the agency best suited to determine whether and when to introduce new emissions control technologies into the Commonwealth. IDC Bellingham Decision, 9 DOMSB at 35; Sithe Edgar Development LLC, 10 DOMSB 1, at 36 (2000) ("Sithe Edgar Decision"); Brockton Power LLC, 10 DOMSB 157, at 190 (2000) ("Brockton Power Decision"). The Siting Board notes that MADEP, as part of its air plan approval process, will determine the level of NO_X control that constitutes LAER for this facility and the method that constitutes BACT, and in doing so will take up, with the information then available, the issue of whether an ammonia-free NO_X control technology

constitutes BACT and LAER for the proposed facility. The Siting Board notes that MADEP's determination of BACT incorporates consideration of feasibility, cost, and environmental protection, and thus is generally consistent with the Siting Board's mandate to minimize both environmental impacts and the cost of mitigating or controlling such impacts. The Siting Board therefore finds that in meeting BACT and LAER for NO_X as set forth by MADEP in a future air plan approval, Nickel Hill would minimize NO_X emissions and ammonia slip from the proposed facility consistent with minimizing the cost of mitigating, controlling, and reducing such emissions.

The Siting Board notes that many of the issues discussed above, including specific emissions limits for criteria and non-criteria pollutants, the determination of which technologies are BACT or LAER for such pollutants, the specific determination of whether to use $SCONO_X$ or another zero ammonia NO_X control technology to address safety and emissions issues related to the use of ammonia for NO_X control, and the approval of VOC and NO_X offset plans, ultimately fall within the jurisdiction of MADEP and will be further addressed in the MADEP air plan approval process for the proposed facility. Because an air plan approval is required by state and federal law for generating facilities such as the proposed facility, the assumption that such an approval must be obtained, and that these issues must be finally resolved, before construction is implicit in every Siting Board approval of a generating facility. Here, because concerns about the proposed facility focus on its air emissions, we find it appropriate to make that point explicit. Consequently, the Siting Board directs the Company, prior to commencement of construction of the proposed facility, to obtain from MADEP an air plan approval addressing:

1. specific emissions limits for regulated pollutants consistent with all relevant public health standards;
2. BACT and LAER determinations for each regulated pollutant;
3. the use of $SCONO_X$ or another zero ammonia technology for NO_X control; and
4. VOC and NO_X offset plans.

The Company shall file a copy of the air plan approval with the Siting Board prior to commencement of construction of the proposed facility, and shall note any differences between

the terms of the air plan approval and the terms of this Final Decision so that the Siting Board may decide whether to inquire further into a particular issue.

With respect to emission offsets, the Company has discussed how it plans to offset proposed emissions of VOC, NO_X, and CO_2 – pollutants which potentially contribute to regional ground-level ozone concerns and global climate change concerns. The record shows that the Company will obtain VOC and NO_X offsets representing greater amounts of permitted emissions than Nickel Hill will be permitted to emit, by a ratio of 1.26 to 1, and that a majority of the NO_X offsets will be obtained from within the Merrimack Valley. The record indicates also that the Company intends to purchase SO_2 emission allowances to meet the SO_2 offset requirements.

The Company provided a displacement analysis showing that the proposed facility has the potential to reduce New England emissions of CO_2, NO_X, and SO_2 by substituting for power from existing plants. As projected by the Company, emissions of these three air pollutants from the proposed facility would be half or less than half of the emissions displaced from other generators, leading to a regional benefit. However, to the extent that the facility produces electric power that meets new demand for power, these emissions would represent an incremental increase in regional air pollution, rather than a decrease.

In Dighton Power Associates, 5 DOMSB 193 (1997) ("Dighton Power Decision"), the Siting Board set forth a new approach to the mitigation of CO_2 emissions that required generating facilities to make a monetary contribution, within the early years of facility operation, to one or more cost-effective CO_2 offset program(s), with such program(s) to be selected in consultation with the Siting Board staff. Dighton Power Decision, 5 DOMSB at 239-240. In the Dighton Power Decision, the Siting Board expressed an expectation that the contribution of future project developers would reflect the approach set forth in the Dighton Power Decision, which was determined as an offset based on one percent of annual facility CO_2 emissions, at $1.50 per ton, to be donated in the early years of facility operation.[56] Id. at 240.

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[56] The Siting Board recognizes that, in future reviews, evidence may be developed that supports use of a different assumed monetary value for the cost of providing CO_2 offsets, or use of a range of monetary values, or a greater or sole use of a non-monetary basis, in determining the appropriate level of CO_2 mitigation. Future applicants are put on notice

(continued...)

Here, consistent with its rulings in recent cases, the Siting Board directs the Company to make a monetary contribution to cost-effective CO_2 mitigation programs in an amount that reflects the proposed facility's annual CO_2 emissions of 2,278,663 tpy over 20 years of operation. Based on the projected maximum annual CO_2 emissions and assuming distribution in five annual installments, the contribution requirements would total $725,866, when adjusted for cost increases.[57] Therefore, the Siting Board requires the Company to provide $725,866 to be paid in five annual installments during the first five years of facility operation, to a cost effective CO_2 offset program or programs to be selected in consultation with the staff of the Siting Board. Alternatively, the Company may elect to provide a single contribution of $590,819 by the end of the first year of facility operation.[58]

Based on the analysis above, the Siting Board finds that, with implementation of the proposed mitigation and the condition outlined above, the air quality impacts of the proposed facility would be minimized.

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56 (...continued)
that the Siting Board may seek to develop evidence relating to the appropriateness of the review standards set forth in the Dighton Power Decision or other reviews, and separately that the Siting Board may adjust its existing monetary standard to account for inflation or other similar minor changes based on the passage of time.

57 The contribution is based on offsetting one percent of facility CO_2 emissions, over 20 years, at $1.50 per ton. The 20-year amount of $683,599 is first distributed as a series of payments to be made over the first five years of project operation, then adjusted to include an annual cost increase of three percent. Annual contribution amounts would be distributed as follows: year one $136,720; year two $140,822; year three $145,046; year four $149,398; year five $153,880. See Sithe West Medway Development LLC, 10 DOMSB 274, at 309 (2000) ("Sithe West Medway Decision"); Brockton Power Decision, 10 DOMSB at 193; U.S. Generating Company, 6 DOMSB 1, at 125, 128-129 (1997) ("Millennium Power Decision").

58 This figure is calculated by discounting, at ten percent annually, the five annual payments totaling $725,866. See Sithe West Medway Decision, 10 DOMSB at 309; Brockton Power Decision, 10 DOMSB at 193; Millennium Power Decision, 6 DOMSB at 125, 128-129. The single up-front payment of $590,819 would be due by the end of the first year of operation.

C. Water Resources

The following section describes the water resource impacts of the proposed facility, discusses possible cooling system alternatives to mitigate impacts, and compares the cost and benefits of these alternatives.

1. Description of Water Intake and Discharges

The Company proposes to use water obtained directly from the Merrimack River for cooling and process uses (Exh. NHE-1, at 1-19). The annual average water demand would be 2.8 million gallons per day ("mgd") (id.; Tr. 5, at 572). This water would be used for cooling tower make-up and demineralizer regeneration throughout the year; for power augmentation by steam injection and inlet air evaporative cooling on a seasonal basis; and for periodic filter backwashes and equipment washdowns (Exh. NHE-1, at 1-19). Estimates provided by the Company indicate that the vast majority of water use would consist of evaporation from the wet mechanical cooling towers, which ranges from approximately 1.8 mgd in winter to approximately 3.1 mgd in the summer, with an annual average evaporation of approximately 2.6 mgd (id.; Exh. NHE-2, at 3-14). Lesser amounts of water go to the following (with approximate average annual rates usage in parentheses): power augmentation (107,000 gallons per day ("gpd")), cooling tower blowdown (79,000 gpd), evaporative air cooling (20,000 gpd), HRSG feedwater (20,000 gpd), sand filter backwash (2,000 gpd), and other process water (Exh. NHE-1, at 1-19). Potable water for the facility (1,000 gpd) would be obtained from the Dracut municipal water supply (Exhs. INT-MVRE-G-7(a), Att. at 4-7, 5.3-5; INT-MVRE-G-7(d), Bulk Att. at 4-7). The connection to the existing municipal water supply would be on Methuen Street, to the west of the proposed facility (Tr. 1, at 29).

The Company indicated that the wet mechanical draft cooling towers would be used to cool the steam turbine condenser and other cooling loads by direct heat transfer to air and by evaporation of water (Exh. NHE-1, at 1-20). Since evaporation tends to concentrate dissolved solids, some cooling tower water is continuously drawn off and replaced with fresh water, to limit dissolved solid concentrations in the cooling tower water (id.). Power augmentation by steam injection uses water to enhance power output during peak demand periods, which occur in

the summer; inlet air evaporative cooling also allows for maintenance of power output during periods of warm weather (id. at 1-21). HRSG feedwater replaces blowdown from the HRSG (Exh. NHE-2, at 3-15).

The Company stated that overall water use would be higher in the summer when cooling tower evaporation is greatest and both power augmentation and inlet air cooling would be used (Exh. NHE-1, at 1-19). The Company stated that average plant water requirements would range from approximately 1.9 mgd in the winter to 3.6 mgd in the summer, with a maximum 24-hour rate of 3.9 mgd, and a peak rate of 4.4 mgd (id.; Exh. RR-EFSB-72).

Nickel Hill has proposed to withdraw water from the Merrimack River to meet its cooling and process water demands, using pumps with a maximum capacity of 4 mgd and with onsite storage capacity of 1.5 million gallons making up the balance over any short time period (Tr. 18, at 2148). Because the volume withdrawn exceeds 100,000 gpd for a prolonged period, the facility would need to get approval for the withdrawals from MADEP in accordance with the Water Management Act (Tr. 6, at 730).

The Company indicated it would limit its water consumption through internal reuse of 20,000 gpd of HRSG blowdown in cooling tower make-up; use of drift eliminators in the cooling towers; high cycles of concentration in the cooling towers; and use of water-conserving sanitary fixtures, in accordance with the state building code (Exh. INT-MVRE-G-7(a), Att. at 5.3-5, 5.3-6; Tr. 5, at 584).

The proposed water intake structure would be an infiltration bed design called a "Johnson screen" that would be installed flush to the bottom of the Merrimack River (Exh. NHE-1, at 1-23, 4.3-1). As described by the Company, the water intake would be located within a pool extending upstream from the Essex Dam, which is located 4.7 miles downstream in Lawrence (id. at 4.3-3). The preferred intake location is approximately 33 miles from the mouth of the river at Plum Island (Tr. 5, at 590).[59] A valve pit, wet well, and pump house would be built to the north of

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[59] Two intake locations have been most recently discussed by the Company; the preferred location as shown on site plans is in the Merrimack River approximately 800 feet south of the Route 110/Brox access road intersection (Exhs. EFSB-W-3; INT-MVRE-G-7(a), Att. at fig. 3.1-2; INT-MVRE-G-7(d), Bulk Att. at fig. 3.1-2).

Route 110 to pump water up to the proposed facility (Exhs. NHE-1, at 1-23; INT-MVRE-G-7(a), Att. at 3-17). The water intake would be regulated by dredging and navigable waters programs of the U.S. Army Corps of Engineers, waterways license and water quality certification from MADEP, review by the Massachusetts Division of Fish and Wildlife, and permitting by the Dracut Conservation Commission (Exh. EFSB-W-1).

The Company stated that a new wastewater discharge line would be built from the proposed facility to connect with existing Dracut sewers at the intersection of Route 110 and York Street, following a route along Methuen Street, the Brox access road, and Route 110 (Exh. NHE-2, at 5.7-1). The Company stated that the project would discharge approximately 133,000 gpd of wastewater to the Lowell Regional Wastewater Utility ("LRWU") in summer and 64,000 gpd in winter (id.; Exh. EFSB-W-7). The wastewater would contain concentrated dissolved solids from river water plus water treatment chemicals, some of which would be added specifically to control the pH of the wastewater (Exhs. NHE-2, at 5.7-1; EFSB-W-8; Tr. 6, at 796).[60] The Company stated that the sanitary wastewater from the facility would be discharged to an on-site septic system (Exh. INT-MVRE-G-7(a), Att. at 5.5-1). The Company asserted that wastewater from the proposed project would have no impact on water quality in the Merrimack River (Exh. NHE-1, at 4.3-20).

The Company stated that the facility is being designed to comply with the performance standards of the MADEP Stormwater Management Policy (Exh. EFSB-H-2). The Company stated that just under six acres of impervious surface would be created at the site, some of which is already disturbed (Tr. 6, at 690). The Company plans to construct three stormwater retention basins to handle stormwater runoff (Tr. 6, at 691). The Company described additional plans to manage stormwater during the construction phase of the project and during long-term operations (Exh. NHE-1, at 4.5-1). The Company specified that MADEP and EPA guidelines would be

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[60] Dissolved solids in wastewater would include sodium, calcium, magnesium, chloride, silicate, and sulfate ions (Exh. EFSB-W-8). The Company also indicated that it would be adding sodium hypochlorite to cooling tower water, and antiscalants, corrosion inhibitors, and oxygen scavengers to HRSG feedwater (Exh. NHE-2, at 5.12-6). No specific information on the HRSG additives was provided for the record.

followed for erosion and sedimentation control during construction (id.).[61] Measures would include barriers of staked haybales or silt fence, anti-tracking pads at construction exits, seasonal (spring) pavement sweeping, cleaning of catch basins, temporary mulching or similar measures, and establishment of a permanent vegetative cover or other stabilization as soon as practicable (id. at 4.5-1, 4.5-2; Exh. INT-MVRE-G-7(a), Att. at 5.7-5). The Company stated that a Stormwater Pollution Prevention Plan ("SWPPP") would be prepared prior to the start of construction (Exh. EFSB-W-10-S).

2. Potential Impacts

Nickel Hill asserted that water withdrawals for the proposed project would not measurably influence the flow regime of the Merrimack River.[62] In support, the Company stated that the Merrimack River basin is the fourth-largest river basin in New England and noted that larger streams or rivers such as the Merrimack River are less sensitive to water withdrawals and impoundments than smaller streams (Exh. NHE-1, at 4.3-1, 4.3-7).

The Company provided water flow data for the Merrimack River, from 1923 through 1997, as measured by the U.S. Geological Survey ("USGS") at the Lowell USGS gaging station, 3.9 miles upstream of the proposed project water intake (id. at 4.3-5, 4.3-6). The drainage basin above the gaging station is 4,635 square miles, or 95 percent of the area of the basin above the project, so flows at the water intake are slightly understated by using data from the Lowell gaging station (id.). Measured at the gaging station, the average flow of the Merrimack River has been 4,978 mgd since 1923, which the Company compared to an average projected consumption by

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[61] The Company stated that the erosion and sediment control program would comply with the requirements of the National Pollutant Discharge Elimination System General Permit for Storm Water Discharges from Construction Activities and would incorporate Best Management Practices specified in MADEP guidelines and a 1992 EPA document entitled "Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices" (Exh. NHE-1, at 4.5-1).

[62] Maintenance of flow in the Merrimack River was an issue of concern to several intervenors and MEPA commenters (see Exhs. NHE-1, at 4.3-26; INT-MVRE-G-7(a), Att. at sec. 7.0, comments 6.5, 7.1, 8.1, 11.4, 12.1, 12.3, 20.4 on the Draft Environmental Impact Report ("DEIR").

the proposed facility of 2.8 mgd, or 0.06 percent of average river flow (id.; Exh. NHE-2, at 2-5).

The Company stated that the recorded flow on the Merrimack River has ranged from a high of 111,800 mgd, on March 20, 1936, to a low of 128 mgd on September 23, 1923 (Exh. NHE-1, at 4.3-5). The Company attributed the unusually low minimum recorded flow to accumulation of water at upstream mill pools during industrial-age summer weekend downtime at the mills; the Company suggested that conditions this extreme, which were due to historic anthropogenic influence, no longer occur (id. at 4.3-5, 4.3-7). The Company indicated that flow in the river is still modified by a number of artificial influences, including water supply withdrawals and impoundments (id. at 4.3-5).

The Company indicated that a standard measure of anticipated low flow used for water use planning purposes is the lowest seven-day average flow with a recurrence interval of once every ten years, known as the "7Q10" (id. at 4.3-7). The Company provided annual data on lowest seven-day average flow at the Lowell gaging station for years since 1923, and indicated that the calculated 7Q10 flow based on the historical data is 614 mgd (id.).[63, 64] The Company indicated that the seven-day low flow with a recurrence interval of 100 years, the 7Q100, is estimated to be 487 mgd (id.).

The Company noted that the average consumption rate of the proposed plant during summer months, 3.6 mgd, would be less than one percent (0.6 percent) of the 7Q10 flow of the Merrimack River (id. at 4.3-14; Exh. NHE-2, at 2-5).[65] The Company therefore concluded that

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[63] The Company indicated that the 614 mgd rate was based on 1923 to 1992 data and that it is equivalent to 950 cubic feet per second ("cfs") (Exh. INT-MVRE-G-7(a), Att. at 5.3-2). In response to comments, the Company included 1993 to 1999 data as part of the historical record, and recalculated the 7Q10 as 941 cfs, or one percent less than the previously presented value, 950 cfs (id.).

[64] The data show a higher average annual level of lowest seven-day average flow ("7Q") in the earlier part of the period of record than in the later part; for example, based on Siting Board staff calculations, the average 7Q was 1,542 cfs for the years 1923 to 1960, and 1,482 cfs for the years 1923 to 1965, but declined to an average of 1,316 cfs for the years 1966 to 1999 (Exh. RR-EFSB-21).

[65] The Company stated that the design flow rate of the intake pumps is 4 mgd (Tr. 18, at

(continued...)

the project would not affect downstream uses of the river, including water supply, wastewater discharge, hydropower,[66] and recreation (Exh. NHE-1, at 4.3-20 to 4.3-26; Tr. 5, at 598).[67]

To address whether the proposed withdrawal could result in cumulative impacts when combined with other changes in water use patterns, the Company provided information on water use characteristics and trends for the Merrimack River basin as a whole, and for the reach of the river in which the project intake would be located. Citing a water use analysis included as part of the 1996 Merrimack River Initiative ("MRI") report, the Company indicated that most existing water use in the Merrimack River basin is non-consumptive (Exhs. RR-EFSB-17; RR-EFSB-15; Tr. 5, at 610-611).[68] The Company stated that the largest consumptive use of water within the Merrimack River basin is an out-of-basin transfer to the Massachusetts Water Resources Authority ("MWRA") from the Wachusett Reservoir system, and that other non-domestic consumptive uses include evaporative losses of less than 15 mgd for industrial and irrigation

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65 (...continued)
2148). Calculation by Siting Board staff indicates that this design flow rate of the intake pumps is 0.7 percent of the 7Q10 river flow and 0.8 percent of the 7Q100 river flow.

66 The Company stated that the Essex Company has a charter from the legislature to produce hydropower at Lawrence, downstream of the proposed facility (Tr. 5, at 599-604). The Company acknowledged that production of hydropower at Lawrence would theoretically be affected by the proposed facility and estimated the effect as a reduction of 0.008 MW (Exh. NHE-1, at 4.3-25). The Company stated that it has reached general agreement with the Essex Company on business terms, which would compensate for the reduction in power without necessarily resolving legal issues on water rights (Exh. EFSB-W-2-S2; Tr. 5, at 599-604; Tr. 15, at 1911-1912).

67 The Company indicated that any small changes in water levels in the river caused by facility operation would be dwarfed by fluctuations brought about by operation of the Essex Dam, such as during repair of sacrificial flash boards atop the dam (Tr. 5, at 596).

68 The Company stated that the MRI report identified a total water usage of 658.64 mgd, including as predominant shares 391.90 mgd for public water supply and 220.75 mgd for a once-through cooling system at a thermo-electric facility in the mid-to-upper portion of the basin (Exh. RR-EFSB-17). With respect to the public water supply usage, the Company stated that typically 80 to 85 percent of water withdrawals are returned as sewage, reflecting losses to leakage and to consumptive uses such as washing cars and watering gardens; however, sewage volumes also may be increased by infiltration/inflow of groundwater or stormwater into sewer lines (Tr. 5, at 614-615).

purposes (id.; Exh. INT-MVRE-G-7(a), Att. at 5.3-4). With respect to future trends, the Company asserted that consumptive use in the watershed would not necessarily increase significantly with population growth that is anticipated in the region,[69] that it was not aware of any active consideration of increasing withdrawal from the watershed by the MWRA, and that the one other known power plant proposed for the watershed, AES Londonderry in New Hampshire, is expected to use 2 or 3 mgd of water for cooling tower make-up (Exh. INT-MVRE-G-7(a), Att. at 5.3-5; Tr. 5, at 608, 613, 616).

The Company indicated that, in the reach of the river consisting of a pool above the Essex Dam ("Essex Dam pool"), where the project intake would be located, river flows are subject to effects of the management practices of the operators of the Essex Dam (Exh. EFSB-W-14) as well as effects of other water withdrawals from the Essex Dam pool. The Company explained that during low flow periods, i.e., 7Q10 flow or less, the operators of the Essex Dam are required to maintain a minimum flow past the dam equalling inflow to the Essex Dam pool or 614 mgd, whichever is less (Exh. EFSB-W-14; Tr. 6, at 705). The Company was unable to identify procedures used by the dam operators to ensure the required flow past the dam, but indicated that maintaining the pool at a constant level would be the likely means for ensuring that the inflow-to-the-pool flow requirement was met at the dam (Tr. 6, at 718-724).[70]

The Company indicated that other water supply uses in the area of the Essex Dam pool, downstream from the Lowell gaging station, include withdrawals by the Lawrence and Methuen municipal water systems, taken directly from the pool, and withdrawals by the Andover municipal system taken from a tributary stream that discharges to the pool (Exh. RR-EFSB-18,

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[69] The Company noted that trends in overall water use are positively correlated with population growth, and cited population projections that estimate increases over the next ten years of 10.6 percent for New Hampshire, and within Massachusetts, 2.2 percent for Middlesex County and 5.9 percent for Essex County (Exh. RR-EFSB-17S). At the same time, the Company cited its investigation of usage in eight Massachusetts public supply systems, which indicates irregular trends in recent years with declining usage in some communities (id.; Exh. RR-EFSB-66).

[70] The Company acknowledged that given the assumed low flow operating procedure for the Essex Dam, the effect of the added withdrawal for the proposed project may be to slightly reduce the flow of the Merrimack River at the Essex Dam (Tr. 6, at 711-712).

Att.; Tr. 5, at 625-627).[71] Return flows from these water systems occur via the Greater Lawrence Sanitary District's ("GLSD") wastewater treatment plant located on the Merrimack River two miles downstream of the Essex Dam (Exh. RR-EFSB-18, Att.; Tr. 5, at 628-629). Thus, for the portion of the Merrimack River between the Essex Dam and the GLSD discharge, flows are reduced by the total amounts of municipal water system withdrawals, not just the consumptive component of those withdrawals (Tr. 5, at 628-629).

To help address possible cumulative impacts of the proposed project withdrawal together with other future water withdrawal amounts from the Essex Dam pool, the Company provided current water use trends, as well as existing and future withdrawal permit limitations, for the Lawrence, Methuen, and Andover water systems (Exhs. RR-EFSB-66; RR-EFSB-20-S, Att.). The Company reported that average annual water use in the three communities declined from a total of 22.5 mgd in 1995 to 19.9 mgd in 1998, noting that each of the communities showed reductions that may be attributable to population declines, water pipe repairs or improvements, or use of low flow fixtures in new or rehabilitated structures (Exh. RR-EFSB-66). The Company further reported that the permitted withdrawals for Lawrence, Methuen, and Andover through 2015 total 22.56 mgd (Exh. RR-EFSB-20-S, Att.).

As possible mitigation for any potential impact of its proposed withdrawal during low flow conditions, the Company identified the option of curtailing its water use on a contingency basis, e.g., if river flow is less than the 7Q10 rate (Tr. 5, at 632-636). The Company explained that it could reduce its peak 24-hour water use by 648,000 gpd, if it ceased its use of steam augmentation, and by 72,000 gpd, if it ceased its use of air inlet cooling (Tr. 5, at 633-634). The Company argued that it was unnecessary for it to develop plans for or agree to use such contingency measures, given that its proposed peak use is less than 1 percent of 7Q10 flow (Tr. 5, at 635-636).

With respect to the proposed intake structure, the Company stated that the intake screen

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[71] The Company indicated that although the City of Haverhill and Town of North Andover are located downstream of the Essex Dam and also rely on surface water supply, withdrawals are from Kenoza Lake, Millvale Reservoir, and Lake Cochichewick located on tributaries of the Merrimack River (Exhs. RR-EFSB-19, Att.; RR-EFSB-66).

was designed to minimize the approach velocity of water entering the screen (Exh. NHE-2, at 5.6-10). The water intake approach velocity was calculated as 0.003 feet per second, which compares to an estimated river flow velocity of 0.4 to 1.2 feet per second and an EPA design guideline for screen intake velocity of 0.5 feet per second (id. at 5.6-11; Exh. INT-MVRE-G-7(d), Bulk Att. at 4-13, 8-7; Tr. 18, at 2145). The velocity through interstices in the rock cladding was estimated to be 0.03 feet per second (Tr. 18, at 2145, 2170).

To construct the infiltration bed, the Company would excavate sediment by dredging from a barge, with offsite disposal of sediments, and then lower into place a largely preconstructed infiltration bed (Exh. EFSB-W-11; Tr. 5, at 661; Tr. 18, at 2173). As required by Section III.C of the Special Permit, construction would not occur between March 15 and June 15 to avoid anadromous fish spawning (Exhs. EFSB-W-19; EFSB-G-13(d)). The Company would use silt curtains in the river to mitigate turbidity impacts during construction (Tr. 5, at 562, 661). The Company stated that the riverbed would be reconstructed by placing 4-inch broken stone in wire-gabion baskets over the infiltration bed, with additional rip-rap set above that at the grade of the existing river bed (Exh. NHE-2, at 6-4). The Company stated that, although there would be construction impacts at the river bank, it would minimize the area cleared of vegetation, and use silt fences, hay bales, and revegetation to mitigate construction impacts (id. at 5.6-11).

The Company indicated that periodic backwashing of the intake would likely be required, for periods of up to 30 minutes, two to four times per year, and noted that because backwashing would most likely be required during seasonal high flows, the procedures would re-suspend sediments into river waters that would already contain a seasonally high amount of suspended sediment (Exh. EFSB-W-18). Based on the low-approach velocity infiltration bed, mitigation of turbidity during construction, and low water consumption relative to total river flow, the Company predicted that, overall, construction and operation of its water intake would not result in impacts to fish (Exh. NHE-1, at 4.3-24).

The Company evaluated installation of radial wells (Ranney collectors) as an alternative to an infiltration bed (Johnson screen) for the water intake, and indicated that a Ranney collector would be somewhat preferable for minimizing environmental impact during construction (Exh. INT-MVRE-G-7(a), Att. at 4-13; Tr. 6, at 695). However, the Company stated that subsurface

conditions precluded use of Ranney collectors, so the Johnson screen approach was selected instead (id. at 4-13).

The Company stated that water quality in the Merrimack River has improved significantly in the last thirty years, with construction of primary, secondary, and tertiary treatment facilities for wastewater (Exh. NHE-1, at 4.3-8). The Commonwealth of Massachusetts classifies the fresh-water reaches of the Merrimack River as Class B, which designates it as habitat for fish, other aquatic life, and wildlife;[72] for primary and secondary recreational contact; as a potential source for a treated public water supply; and for agricultural and industrial uses (id. at 4.3-8). The Company identified low levels of dissolved oxygen, high nutrient loading, and high fecal coliform following heavy rainfalls as water quality issues that were prevalent around 1990 (id. at 4.3-10, 4.3-11). The Company stated that current water quality sampling indicates that the quality of the river water is generally good or very good, with the exception of problems due to release of untreated sanitary wastewater from combined sewer overflows during wet, rainy weather (id. at 4.3-10, 4.3-11).

Wastewater flows from the project, exclusive of sanitary wastewater flows, were estimated by the Company at approximately 91,000 gpd, on average, and 133,000 gpd during the summer, consisting mostly of cooling tower blowdown (Exh. NHE-2, at 5.7-1). The Company reported that the Lowell Regional Water Utility ("LRWU") treats an average dry weather flow of approximately 32 mgd, that Dracut's average daily flow allocation is 2.6 mgd, and that Dracut currently uses 1.35 mgd of that allocation (id.). The Company stated that Dracut's Comprehensive Wastewater Management Plan specifies an allotment of 100,000 gpd for a power plant on an average annual basis (id.; Exh. INT-MVRE-G-7(a) Att. at 5.5-1; Tr. 1, at 126-127). The Company stated that in order to minimize the impact to Dracut's sewer lines and to the LRWU, facility wastewater would be collected in a tank and discharged to the sewer at off-peak hours (Exhs. NHE-1, at 1-21; NHE-2, at 5.7-2).

Overall, the Company calculated that the project's maximum wastewater flow of

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[72] The Company indicated that the Merrimack River harbors fish of many types, including bass, perch, bullhead, shad, herring, and sturgeon (Exh. INT-MVRE-G-7(a), Att. at 5.4-1 to 5.4-5).

133,000 gpd represents 0.4 percent of the LRWU design flow capacity of 32.0 mgd (Exhs. NHE-2, at 5.7-1, 5.7-4; RR-TD-8, Att. at Attachment B). The Company indicated that it would work with Dracut and the LRWU to provide for appropriate infiltration and inflow reductions on the plant's wastewater load originating from Dracut (Exh. NHE-1, at 1-21; Tr. 5, at 742-744, 765-767).

The Company stated that its process wastewater would be pre-treated prior to discharge to the LRWU (Exh. NHE-1, at 4.3-19). The Company stated further that its use of the facility's pretreatment program would aid the LRWU in meeting its surface water discharge permit (id. at 4.3-20). The LRWU releases wastewater into the Merrimack River upstream of the proposed facility intake (Exh. NHE-2, at 5.5-4).[73]

The Company stated that the stormwater detention basins and their outlet control devices would regulate outlet discharge rates at or below pre-development peak rates of discharge, for 2 to 100-year design storm events (id. at 6-5).[74] The consequent settling period would improve the quality of surface water flowing offsite (Exh. NHE-1, at 4.5-3). Mr. Magee, a witness for the Company, indicated that stormwater would readily infiltrate into the sandy glacial soil at the site (Tr. 5, at 555). However, the Company also indicated that water does not readily infiltrate below the ground surface at the site, as evidenced by the presence of surface water features adjacent to the site and by the general lack of seepage out of adjacent quarry walls (Exh. INT-MVRE-G-7(a), Att. at sec. 7, response 9.14; Tr. 6, at 692).

The Company indicated that any groundwater flow through bedrock fractures would generally be eastward towards the Merrimack River (Exh. INT-MVRE-G-7(a), Att. at sec. 7, response 9.14; Tr. 6, at 692). The Company indicated that, based on information provided by officials in Dracut and Methuen, no municipal or private wells are located within 1,000 feet of

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[73] The Company stated that the LRWU is 3.1 miles upstream of the project (Exh. NHE-2, at 5.5-12) and that the Essex Dam pool extends 3 miles upstream of the previously proposed intake location (id. at 5.5-15). Thus, the intake and discharge points are both in the same pool of the river, or close to it.

[74] A two-year storm event is one exceeded on average once every two years; a 100-year storm event is one exceeded on average once every one hundred years.

the project site (Exh. INT-MVRE-G-7(a), Att. at sec. 7.0, response 9.16). The Company indicated that it would conduct limited surface water sampling of Beaver Pond, adjacent to the proposed facility to monitor impacts from construction and the start of operations (id. at sec. 7, response 9.21).

3. Process Alternatives to Reduce Intake of River Water

The Company provided information on two alternative cooling technologies it considered for the project – a wet mechanical cooling system using treated effluent from the LRWU, and an air cooled condenser system (Exh. INT-MVRE-G-7(d), Bulk Att. at 4-6). The Company indicated that, compared to using river water for wet cooling, use of treated effluent for wet cooling would require the same average consumptive water use out of the Merrimack basin, would engender additional costs for a pretreatment system and higher water pumping costs, would require a higher volume of wastewater treatment at the LRWU,[75] and would require construction of a 3-mile water supply line along Route 110 from the LRWU, but would avoid construction costs for an intake system and any impacts at the river intake (id. at 4-10 to 4-12; Exh. RR-EFSB-70). The Company identified advantages of air cooling as: the elimination of consumptive water use for cooling; elimination of cooling tower blowdown discharges to the LRWU; lack of visible plumes from cooling towers; and a smaller water intake structure in the Merrimack River (Exh. INT-MVRE-G-7(d), Bulk Att. at 4-10). The Company identified disadvantages of air cooling as: (1) the need for a larger and taller cooling structure[76] and

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[75] Effluent from the LRWU would have a higher dissolved solids content, and specifically a higher dissolved silica concentration, which requires more treatment prior to use in the HRSGs, reduces potential recycling of cooling tower water by approximately half and increases cooling tower blowdown (Exh. RR-EFSB-71; Tr. 18, at 2133). Discharge to the LRWU would be increased from 79,000 gpd to 250,000 gpd, thereby exceeding Dracut's planning allotment of 100,000 gpd from a power plant (Tr. 18, at 2181-2182). The practical significance of an increase in the volume of water discharged to the LRWU would depend on whether the discharge were flowed through primary and secondary treatment processes (Tr. 5, at 641).

[76] For a wet-cooled condenser, a 36,000 square-foot structure with a height of 55 feet is

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possibly a proportionally higher facility stack; (2) loss of an average of 20 MW (2.8 percent) of power and its concomitant earnings loss and lessened air emissions displacement;[77] and (3) substantially higher costs to mitigate noise impacts (id. at 4-10 to 4-12; Exh. RR-EFSB-70).[78] The Company indicated that the extra cost, over 20 years, of using treated effluent, including construction, operation, and lost capacity, would be $6.2 million and the extra cost of using air for cooling would be $48 million, relative to using river water for wet mechanical cooling (Exh. INT-MVRE-G-7(d), Bulk Att. at 4-10).

4. Analysis

The record indicates that the proposed facility would use on average 2.8 mgd of water, almost all of which would be withdrawn from the Merrimack River. The vast majority of this water use would be for wet mechanical cooling. Based on the Company's estimates of an average 2.6 mgd of evaporation, the proposed 750 MW facility would use approximately 3,700 gpd of water per MW of capacity and "consume" approximately 3,500 gpd per MW. This

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[76] (...continued)
proposed; a dry-cooled condenser meeting noise requirements would be approximately 60,000 square feet and 90 to 110 feet tall, according to the Company (Exh. INT-MVRE-G-7(d), Att. at 4-10; Tr. 18, at 2115, 2180).

[77] The Company stated that the comparative loss in plant output associated with selecting air cooling over wet mechanical cooling ranges from 15 MW (2.0 percent) in winter to 27 MW (3.9 percent) in summer (Exh. RR-EFSB-70). The Company estimated that the reduced displacement of power from other generating facilities would lead to increased regional emissions of 210 tpy NO_X and 731 tpy SO_2, compared to using wet cooling (Exh. INT-MVRE-G-7(d), Bulk Att. at 4-11).

[78] The Company indicated that air-cooled condensers are typically louder than wet mechanical systems due to the larger and more numerous fans required (Exh. MRWC-2). The Company compared the costs of noise mitigation for the proposed facility using an air-cooled condenser and two different wet mechanical cooling units, assuming in each case an acoustic performance of 48 decibels at 400 feet (Exh. INT-MVRE-G-7(d), Bulk Att. at 4-9 to 4-12, 6-19). The Company noted that while this level of noise control could be achieved for either an air-cooled or a water-cooled facility, the cost of achieving it (including capital costs plus operation and maintenance costs over 20 years) would be $41.8 to $48 million greater with the air-cooled condenser (id. at 4-8, 4-9, 4-11).

rate of water consumption compares favorably with the per-MW use of water-cooled facilities previously reviewed by the Siting Board.[79] However, it is significantly higher than the water requirements of recently reviewed air-cooled generating facilities.[80]

Nickel Hill has identified design options, including air cooling and use of treated effluent for cooling and process water, that would reduce the demands of the proposed facility on the Merrimack River. However, the Company argues that, given the high volume of the Merrimack River, the proposed water withdrawals would have an insignificant impact on the river, and that the facility as proposed therefore would minimize water resource impacts. To evaluate this argument, the Siting Board must first consider the impacts of the proposed water withdrawal on: (1) flow in the Merrimack River, (2) water quality in the Merrimack River, (3) fish or other aquatic life in the Merrimack River, and (4) wastewater.

With respect to flow in the Merrimack River, the record indicates that less than one percent of river flow would be diverted under low flow river conditions such as the 7Q10 flow volume. Thus, the record demonstrates that the proposed water use, considered separately, would not result in any appreciable change in flow rates on the river downstream of the proposed facility, even during summer drought (i.e., 7Q10 or 7Q100) conditions.

Based on information in the record, the Siting Board also considers the potential for

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[79] Comparable usage rates for other facilities using wet mechanical cooling are 5,185 gpd per MW for the 270 MW Brockton Power facility, 6,900 gpd per MW for the 360 MW Millennium facility, 6,986 gpd per MW for the 146 MW Enron facility, and 8,333 gpd per MW for the 240 MW Masspower facility. Brockton Power Decision, 10 DOMSB at 157, 202 (2000); Millennium Power Decision, 6 DOMSB 1, at 12, 129; Enron Power Enterprise Corporation, 23 DOMSC 1, at 140 (1991); Masspower, Inc., 20 DOMSC 301, at 305, 390 (1990).

[80] The comparable usage rates for recently reviewed air-cooled facilities include: 169 gpd per MW for the 775 MW Sithe Edgar project; 87 gpd per MW for the 1550 MW Sithe Mystic project; 272 gpd per MW for the 580 MW ANP Blackstone project; 256 gpd per MW for the 580 MW ANP Bellingham project; and 613 gpd per MW for the 170 MW Dighton Power project. Sithe Edgar Decision, 10 DOMSB at 55; Sithe Mystic Development LLC, 9 DOMSB 101, at 145 ("Sithe Mystic Decision"); ANP Blackstone Energy Company, 8 DOMSB 1, at 146 (1999) ("ANP Blackstone Decision"); ANP Bellingham Energy Company, 7 DOMSB 39, at 170 (1998) ("ANP Bellingham Decision"); Dighton Power Decision, 5 DOMSB at 240.

cumulative effects from the proposed project and other expanded water uses in the Merrimack River basin. The Company identified a planned new AES Londonderry Project in New Hampshire as an added consumptive use of 2 to 3 mgd, and intervenors have raised concerns about increased consumptive use from general growth in the basin. Additionally, immediately downstream of the Essex Dam, the effect of flow reductions from the proposed project would be in addition to the effect of any increase in water use by municipal systems that withdraw water from the Essex Dam pool or its tributaries, with return flow at the GLSD wastewater treatment plant. Aside from the AES Londonderry Project, however, it is unclear that increased surface water withdrawals for municipal or industrial use, with associated consumptive losses, will actually occur.[81] The record shows that the water systems in the vicinity of the Essex Dam pool are experiencing declines in water use, a trend that may well be present in other municipal water systems that use the river upstream of the pool. While there also is the potential for increased consumptive water use associated with general growth in the Merrimack River basin, the effects of some such use changes, if they occur, on low flow in the lower portion of the Merrimack River may be diminished based on the specific locations and the type of sources of withdrawals. Overall, the Siting Board finds that the proposed facility's water consumption would not appreciably reduce the flow in the Merrimack River.

The record indicates that the proposed project would have minimal impacts on water quality in the Merrimack River. The record shows that the consumptive water use by the proposed facility is approximately 0.06 percent of the average flow of the Merrimack River; therefore, increases in the concentration of dissolved solids after their return to the river would be minimal. The Siting Board therefore finds that the proposed facility's water consumption would have a minimal effect on water quality.

Water would be withdrawn from the Merrimack River through a water infiltration bed in the bottom of the river, designed so that the velocity of water moving into the bed would be slow

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[81] Although the record shows that much of the expected increase in demand for water will be returned as discharges to the watershed, the record provides little or no information on the potential redistribution of discharges to seasons with a higher volume of runoff (during storms and during snowmelt), potentially due to activities such as snowmaking or paving over soils, that might reduce the 7Q10 volumes in the future.

enough to allow fish and other aquatic organisms to avoid entrainment/impingement. While there would be some resuspension of river sediments by periodic backwashing of the filter bed, there is no evidence that adverse effects on fish or other aquatic life would be expected from operation of the water infiltration bed. Therefore, the Siting Board finds adverse impacts on fish and other aquatic life from the proposed facility would be minimal.

The Company indicated that the small amounts of process water discharged from the facility to the municipal sewerage system would be equalized and neutralized, that all discharges would comply with pretreatment limits, and that the volumes of sanitary wastewater from the proposed facility would be minimal. The record indicates that the design flow of the LRWU, 32 mgd, just accommodates its average dry-weather flow, 32 mgd. The record shows that facility wastewater would be collected in a tank and discharged to the sewer at off-peak hours in order to minimize the impact to Dracut's sewer lines and to the LRWU. The record shows that Nickel Hill would work with Dracut to reduce inflow and infiltration elsewhere to compensate for the additional volume of wastewater that would be discharged to the LRWU. The record does not specify some of the components of water treatment chemicals added by the facility, and their anticipated breakdown products within the facility or the LRWU. In order to help ensure proper treatment of wastewater discharged into a source of potable water, the Siting Board directs the Company to provide to the LRWU information on the components of the water treatment products that it uses, with copies to the Siting Board. With the above condition, the Siting Board finds that wastewater impacts would be minimized.

While the record shows that retention basins would be built to attenuate surface stormwater flows, the tight bedrock in the quarry area suggests that infiltration into groundwater would be modest. Either way, detention of stormwater by the basins is expected to minimize peak rates of surface water runoff from the site. Consequently, the Siting Board finds that stormwater impacts would be minimized.

The Company addressed options to reduce possible impacts associated with project water use, including the design alternative of using air cooled condensers, and the option of using contingency operating procedures to curtail water use under low flow conditions. With respect to the cooling design alternative, the record demonstrates that the Company's selection of a wet

mechanical cooling design, which accounts for most of the projected demand for water, is attributable to an overall design goal of maximizing the heat rate, or energy efficiency, of the proposed facility. Nickel Hill's analysis of air-cooled condensers indicates that this alternative would greatly reduce water use. The analysis indicates, however, that the use of air-cooled condensers also would significantly reduce the energy efficiency of the facility and would result in considerable additional costs to the Company, partly attributable to increased difficulty in mitigating noise from an air cooling system. The analysis also indicates that a considerably larger structure would be required for cooling purposes, which might in turn lead to an increase in stack height and overall increased visual impacts. Given the finding, above, that the proposed facility would not appreciably reduce the flow in the Merrimack River, the Siting Board finds that wet mechanical cooling for the Nickel Hill facility, rather than dry cooling, best minimizes water supply impacts consistent with minimizing overall environmental impacts and minimizing the cost of mitigating, controlling, and reducing these impacts.

The Company also analyzed the use of treated effluent as a source of cooling and process water that would eliminate the need to withdraw water directly from the Merrimack River. Use of treated effluent has been proposed and found advantageous in some previous Siting Board decisions (e.g., Brockton Power Decision, 10 DOMSB at 157, 205). Here, however, the record indicates that the use of treated effluent instead of Merrimack River water would not affect the total flow of the river, and that considerable additional water pre-treatment and increased pumping would increase costs to the Company. Also, the discharge to the regional water plant, which is operated close to capacity, would increase under the alternative of using treated effluent for cooling. Consequently, the Siting Board finds that wet mechanical cooling for the Nickel Hill facility using Merrimack River water, rather than using treated effluent, best minimizes water-related impacts consistent with minimizing cost.

The record also shows that the Company could use contingency operating procedures to curtail water use under 7Q10 or other low flow conditions – for example, by ceasing use of steam augmentation or air inlet cooling or, in extreme conditions, overall facility operation. Such measures do not appear necessary based on the added consumptive usage from the project alone, which is less than 1 percent of 7Q10 flow, but represent potential mitigation for water use

impacts should growth in consumptive water use in the Merrimack River basin as a whole be found to pose a future environmental or other problem related to low flow in the Merrimack River. The record contains insufficient evidence to support a finding that consumptive use trends in the Merrimack River basin require imposing measures to curtail project water use under low flow conditions. Further, given that such operating curtailments would result in increased operation of other generating facilities, there may be offsetting environmental and cost disadvantages. Therefore, the Siting Board will not require operational restrictions for purposes of water conservation beyond the specific measures which the Company has identified to limit water use at the proposed facility. The Siting Board notes that MADEP will review the proposed water use for the project under the Water Management Act, and could address any environmental or other concerns, and any necessary mitigation, related to the added consumptive water use for the proposed project.

Overall, the record demonstrates that the facility was sited in part to make use of an existing high volume source of fresh water. As such, the design of the facility has the potential to minimize environmental impacts and costs known to be associated with inefficient use of energy resources, albeit at the disadvantage of not minimizing the transfer of water out of the Merrimack River watershed and into the atmosphere. The Siting Board has found above that water flow and water quality impacts of water withdrawal have been minimized, and that adverse impacts on fish and other aquatic life would be minimal. In addition, the Siting Board has found that wet mechanical cooling for the Nickel Hill facility using Merrimack River water, rather than using dry cooling or using treated effluent for wet mechanical cooling, best minimizes water-related impacts consistent with minimizing cost. The Siting Board also found above that wastewater and stormwater impacts of the proposed facility would be minimized. Accordingly, the Siting Board finds, based on the record in this proceeding, that the water resource impacts of the proposed facility would be minimized, consistent with minimizing other environmental impacts and the cost of mitigating, controlling, and reducing such impacts.

D. Wetlands

This section describes wetland impacts which would result from the construction of the

proposed facility and its interconnections, and the proposed mitigation of potential impacts.

1. Description

Nickel Hill indicated that the Dracut Conservation Commission, the MADEP, and the U.S. Army Corps of Engineers would regulate wetland impacts from construction and operation of the proposed facility (Exhs. NHE-2, at 5.8; NHE-1, at 4.4). Wetland resource areas on or near the project site that are protected by local, state, and federal regulations include Land Under Water Bodies and Waterways ("LUW"), Bank of or Land Under Rivers that Underlie Anadromous/Catadromous Fish Runs, Riverfront Area ("RFA"), Bordering Land Subject to Flooding ("BLSF"), Bordering Vegetated Wetlands ("BVW"), and a Vernal Pool[82] (Exhs. NHE-1, at 4.4-3 to 4.4-10; NHE-2, at 5.8-3 to 5.8-8). The Company indicated that it received an Order of Conditions from the Dracut Conservation Commission on January 19, 2000 (Exh. INT-MVRE-G-7(d), Bulk Att. at 3-2).

Nickel Hill indicated that, while most facility structures would be located outside of wetland resource areas and their buffer zones, some portions of the main turbine building and the cooling tower block would be placed within the 100-foot buffer zone but outside a 50-foot setback (Exhs. EFSB-WL-2-S, Att., Attachment A, at 5, 37; INT-MVRE-G-7(d), Bulk Att. at 8-9; Tr. 4, at 526). The Company stated that moving the cooling tower block farther from the wetlands and closer to the turbine and the HRSG building would effectively reduce cooling efficiency, and result in higher air emissions per unit generation (Tr. 4, at 528-529). In addition, 210 linear feet of new paved roadway (the 25-acre site access road) would be within the 100-foot buffer zone (Exh. EFSB-WL-2-S, Att., Attachment A, at 38; Tr. 4, at 522-524). The Company stated that, where feasible, it would maintain a 10-foot "no-disturbance zone" around wetland

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[82] Nickel Hill stated that the Massachusetts Natural Heritage Atlas (1997-98 edition) lists no certified vernal pools on the Brox Industries property (Exh. EFSB-WL-2-S, Att. at Attachment A, at 25-26). However, during initial environmental field work, the Company identified three potential vernal pools; following further field investigation, it concluded that one area, located within a BVW near the transmission line corridor, satisfies the minimum requirements to be recognized as a vernal pool under 310 CMR 10.04 (id.).

resource areas (Exh. EFSB-WL-2-S, Att., Attachment A, at 5-6, 37).[83] However, the Company stated that grading for the cooling tower block would encroach within 10 feet of a wetland area in two locations, and that the new site access road would come within 5 feet of the BVW (Tr. 4, at 519-520, 526). The Company noted that some of the areas where the 10-foot no-disturbance zone would not be maintained were previously disturbed and are devoid of vegetation from quarry operations (Exh. EFSB-WL-2-S, Att., Attachment A, at 6, 37).

Nickel Hill also discussed wetlands impacts associated with the construction of the electric and natural gas interconnections for the proposed facility. The Company stated that construction of the interconnection with the Tennessee natural gas pipeline would result in temporary disturbance within the 100-foot wetland buffer zone, but would not affect any wetland resource areas (Exhs. INT-MVRE-G-7(d), Bulk Att. at 8-10; EFSB-WL-2-S, Att., Attachment A, at 42). Most of the pipeline interconnection route is devoid of vegetation due to on-going quarry operations (Exh. INT-MVRE-G-7(d), Bulk Att. at 8-9). The Company stated that any trees greater than 15 feet in height within 15 feet of either side of the pipeline would be cleared, and that low vegetation would be maintained along a 10-foot corridor centered on the pipeline (id.). The Company also stated that pesticides would not be used along the pipeline right-of-way ("ROW") (id.).

Nickel Hill stated that construction of the overhead electric transmission interconnection would temporarily alter approximately 73,724 square feet of BVW, and that three steel support structures would be installed within the 100-foot buffer zone of BVW, but that no permanent filling of BVW would be required (Exhs. EFSB-WL-2-S, Att., Attachment A, at 7, 50; INT-MVRE-G-7(d), Bulk Att. at 8-10). The Company noted that the transmission layout was designed to avoid impacts to the identified vernal pool (Exhs. EFSB-WL-2-S, Att., Attachment A, at 49; EFSB-WL-4; Tr. 4, at 530-534). The Company stated that selective tree clearing and trimming would be necessary for construction and long term maintenance of the transmission interconnect, but that pesticides would not be used along the transmission corridor (Exhs. EFSB-WL-2-S, Att., Attachment A, at 7, 50; INT-MVRE-G-7(d), Bulk Att. at 8-10).

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[83] Nickel Hill indicated that, in accordance with town bylaws, Dracut seeks to maintain an undisturbed 10-foot buffer around wetland areas (Tr. 4, at 518).

Nickel Hill also analyzed the wetland impacts associated with utility work along the Brox access road and Methuen Street, including the construction of a river water intake main, a sewer force main, a domestic water main, and a sewer pump station, and widening the pavement on Methuen Street. The Company stated that this work would temporarily impact approximately 26,480 square feet of previously altered wetland buffer zone and 950 square feet of previously altered RFA (Exh. EFSB-WL-2-S, Att., Attachment A, at 35). This area is currently composed of impervious surfaces and previously disturbed roadway shoulders (Exhs. EFSB-WL-2-S, Att., Attachment A, at 35; INT-MVRE-G-7(d), Bulk Att. at 8-10). The Company stated it would conduct limited tree cutting in the 100-foot buffer zone along the Brox access road to allow for the installation of erosion and sedimentation control barriers (Exh. EFSB-WL-2-S, Att., Attachment A, at 35).

Finally, the Company evaluated the wetlands impacts of the proposed Merrimack River water intake structure, piping, and pump station. The Company noted that the pump station could be placed in one of two possible locations: at the intersection of Route 110 with the current Brox access road, or at a point 600 feet to the west at a partially paved area on the side of Route 110 known as "the turnaround" (Exh. INT-MVRE-G-7(d), Bulk Att. at 3-23). The Company identified the turnaround as the preferred location of the intake based on subsoil conditions, the expressed preference of Dracut, and discussions with the Massachusetts Highway Department regarding use of the land between the river and the highway (Tr. 18, at 2167-2168).[84] The January 19, 2000, Order of Conditions approved the construction of the pump station at either location, but required mitigation in the form of site cleanup, stabilization of existing exposed bank, and landscaping if the turnaround location is chosen (Exh. INT-MVRE-G-7(d), Bulk Att., at Appendix B at 6-7). Nickel Hill noted that its choice of location would be subject

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[84] Nickel Hill indicated that if the pump station were located at the intersection of Route 110 and the existing Brox access road, the river water intake main would run up the existing Brox access road, along Methuen Street, and up the new 25-acre site access road to the proposed facility. If the pump station were located at the turnaround, the river water intake main would either: (1) follow Route 110 to its intersection with the existing Brox access road and then follow the route described above; or (2) cross Route 110 and follow the new Brox access road until it intersects with the existing Brox access road, and then follow the route described above (Exh. INT-MVRE-G-7(d), Bulk Att. at 3-23).

to further review by MADEP and the Army Corps of Engineers (id. at 3-24).

The Company stated that the construction of the river water intake structure, piping, and pump station would result in temporary impacts on LUW, RFA, and Anadromous/Catadromous Fish Runs (Exh. EFSB-WL-2-S, Att., Attachment A, at 7). Specifically, the Company stated that installation of the river water intake system would require dredging a 40 by 52 foot area of the river bottom to a depth of six feet, for a total displacement of 462 cubic yards of material (id. Attachment A, at 64). The river water intake system itself would be an infiltration bed constructed using "Johnson screens" set in a bed of stone that would be flush with the river bottom (Exh. INT-MVRE-G-7(d), Bulk Att. at 3-20).[85]

The Company stated that construction of the infiltration bed would take place within the riverfront area along the Merrimack River (Exh. EFSB-WL-2-S, Att., Attachment A at 7). However, the Company stated that work in this area would be limited to previously developed areas along Route 110 and the associated ROW (id., Attachment A at 67). The Company stated that sediment from the river-bottom excavation area would be tested to determine appropriate disposal methods (id., Attachment A, at 66). The Company also stated that all materials would be stockpiled on the north side of Route 110 on Brox property beyond the 100-foot buffer zone of jurisdictional wetland resource areas (id., Attachment A, at 68). At the end of each work day, the stockpiles would be surrounded with hay bales and a trenched silt fence (id.). To minimize the effect of sediment disturbance within the river, the Company stated it would install weighted turbidity barriers during dredging operations to contain suspended sediment and limit intrusion into nearby waters and habitats (id.).

The Company indicated that it would implement an erosion and sedimentation control program to minimize impacts to wetlands during construction (Exhs. EFSB-WL-2-S, Att., Attachment A, at 40; INT-MVRE-G-7(d), Bulk Att. at 8-8). The Company stated that the erosion and sedimentation control program incorporates Best Management Practices specified in the guidelines developed by the MADEP and the EPA and complies with the National Pollutant

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[85] The Company also considered using a Ranney collector, which would not require construction within the river, but found that the subsoil conditions did not favor this type of collector (Tr. 15, at 1896).

Discharge Elimination System General Permit for stormwater discharge from construction activities (Exh. EFSB-WL-2-S, Att., Attachment A, at 40). The Company stated that, as part of the sedimentation and erosion control plan, double-staked hay bales and trenched silt fencing would be installed between the boundaries of all wetland resource areas and proposed construction locations (id., Attachment A at 36, 68; Exh. INT-MVRE-G-7(d), Bulk Att. at 8-9).

The Company stated that, prior to construction, it would prepare and submit to the Dracut Conservation Commission for approval a Spill Prevention Plan addressing steps to be taken in the event of an accidental release of a hazardous substance near a wetland area (Exh. EFSB-WL-2-S, Att., Attachment A at 70). As part of this plan, a spill containment kit would be kept on-site in the project manager's trailer throughout construction operations (id. at 70).

2. Analysis

The Siting Board notes that wetlands are considered to be potentially sensitive to direct construction impacts, changes in site hydrology, surface water contamination, and groundwater contamination. Here, the record demonstrates that there would be no permanent alteration of wetlands associated with the construction of the proposed facility, its electric and gas interconnections, or associated utilities and roadways. Portions of the cooling tower block, three steel supports for the transmission interconnection, and approximately 210 feet of roadway would be located within the 100-foot buffer zone. Fill for the cooling tower block and some roadway segments would encroach within a 10-foot "no-disturbance zone" that was requested by the Dracut Conservation Commission under the general wetland protection bylaw. The record demonstrates that the Company designed the facility layout to avoid wetland areas and wetland buffer zones to the extent possible, and that moving the cooling tower block further away from wetland areas would compromise other environmental concerns.

The record also demonstrates that construction of the natural gas pipeline and electric transmission interconnections would result in temporary disturbance within the 100-foot wetland buffer zone, and that utility work would result in the temporary disturbance of approximately 26,480 square feet of wetland buffer zone and 950 square feet of RFA. Much of this area, including all of the RFA, has been previously altered by quarrying or road construction. The

record indicates that project work in wetland buffer zones would be conducted so as to minimize effects on nearby wetlands.

The record shows that the construction of the river water intake structure, piping, and pump station would result in temporary impacts on LUW, RFA, and Anadromous/Catadromous Fish Runs, and that construction of the infiltration bed would affect some previously developed riverfront area. The Company has proposed measures to minimize the effect of sediment disturbance in the river during construction. The Siting Board notes that the record is not clear as to whether the pump station would be located at the intersection of Route 110 and the Brox access road, or approximately 600 feet to the west at the turnaround. However, the Dracut Conservation Commission has approved the construction of the pump station in either location, subject to mitigating conditions. Further, we note that under either scenario, the river water intake main will be placed in roadways, thus limiting wetland and other environmental impacts. Consequently, the Siting Board finds that construction of the pump station in either location, with appropriate mitigation, would minimize wetland impacts.

The record demonstrates no significant anticipated change to site hydrology that would affect wetlands. The record shows that measures would be taken to prevent the spilling of potentially damaging chemicals into the environment at the site. The record also shows that the quality and quantity of water runoff into on-site and off-site wetlands is not expected to change appreciably as a result of the proposed facility. Accordingly, the Siting Board finds that the wetlands impacts of the proposed facility would be minimized.

E. Solid Waste

This section describes the solid waste impacts of the proposed facility and the mitigation proposed by Nickel Hill.

1. Description

Nickel Hill stated that solid and hazardous waste would be generated during construction, operation, and maintenance of the proposed facility (Exh. NHE-1, at 4.6-1, 4.6-2). The Company stated that all solid and hazardous waste at the proposed facility would be properly stored and

removed by appropriately licensed haulers (Exhs. EFSB-SW-2; EFSB-SW-3; NHE-1, at 4.6-1, 4.6-2). The Company also indicated that where feasible, solid waste would be separated into separate streams and recycled (Exhs. EFSB-SW-1; EFSB-SW-3). Furthermore, the Company stated that it would meet all federal, state, and local requirements governing the handling, storage, and disposal of hazardous waste (Exh. EFSB-SW-3).

Nickel Hill stated that approximately 100 tons of solid waste would be generated during construction of the proposed facility (Exh. EFSB-SW-1). This would include approximately 70 tons of excess concrete and 25 tons of scrap metal, as well as excavated soil or rock, packaging material, "empty non-hazardous chemical containers," and scrap material including lumber, insulation, cable, wiring, and siding (id.; Exh. NHE-1, at 4.6-1). Some household-type solid waste would also be produced by the construction work force (Exh. NHE-1, at 4.6-1). In addition, the Company stated that the construction and start-up process would require the use of some cleaning solvents, oils, and solvent based coatings (id.).

The Company indicated that it plans to minimize the volume of soil or rock that must be removed from the site by reusing as much as possible elsewhere on the Brox property, for regrading quarried areas or the construction of berms (id.). The Company anticipated that wood scrap recycling would occur at the Brox Industries waste tree reprocessing area for the manufacture of mulch (Exh. EFSB-SW-1). The Company stated that scrap metal also would be recycled at an appropriate facility (id.). The Company proposed to collect other construction debris in large roll-off containers which would be hauled to an appropriate construction and demolition landfill by a licensed contractor (Exh. NHE-1, at 4.6-1). Hazardous waste and other trash generated during construction would be collected in appropriate containers and removed for disposal by licensed hazardous and solid waste contractors (id.).

The Company indicated that operational solid waste would consist of mixed office waste, water treatment filter media, and various other items including rags, rusted metal, broken machine parts and electrical materials, and empty containers (id.; Exh. EFSB-SW-2). Of the office waste that would be produced, efforts would be made to recycle paper (Exh. NHE-1, at 4.6-1). All other operational solid wastes would be removed by a local waste management firm (Exh. EFSB-SW-2).

The Company stated that maintenance activities would produce some hazardous and non-hazardous wastes, such as spent lubrication oil filters, empty chemical containers, and depleted CO and SCR catalyst units (id.). The CO unit contains platinum as its catalyst, which would be treated as a non-hazardous waste and processed for reuse (Tr. 8, at 1030-31). The Company stated that the SCR catalyst unit "contains some vanadium" and would be treated as a hazardous waste (id. at 1030). The SCR system proposed by the Company would use 72 cubic meters of catalyst per turbine, or a total of 5,090 cubic feet for the facility (Exh. AND-13). The Company stated that it expected to replace the SCR catalyst every five to six years (Tr. 19, at 2397-98). The proper disposal and reprocessing of the CO and SCR catalysts would be the responsibility of the vendor of the replacement catalyst (Tr. 8, at 1030-31). The Company stated that all hazardous waste would be stored for no more than 90 days in a designated area before being removed and disposed of by an licensed hazardous waste contractor (Exh. EFSB-SW-3; Tr. 8, at 1031-33).

2. Analysis

The Company has stated that it would reduce, reuse, and recycle solid waste to the maximum extent possible during construction and operation of the proposed facility, and indicated it would facilitate recycling by the separation of solid waste. The record shows that all remaining waste would be removed by licensed waste contractors and disposed of at appropriate disposal sites for hazardous and non-hazardous waste.

The Siting Board notes that the proposed facility is a gas-fired facility, and that the Company's choice of fuel contributes considerably to the minimization of solid waste impacts, when compared to a coal fired plant. See, e.g., Silver City Energy Limited Partnership, 3 DOMSB 1, at 173-174 ("Silver City Decision"). The Company's commitment to recycle both construction and operational solid waste, where possible, contributes to minimizing the solid waste impacts of the proposed facility. Accordingly, the Siting Board finds that the solid waste impacts of the proposed facility would be minimized.[86]

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[86] The Siting Board notes that it will require future applicants of proposed generating (continued...)

F. Visual Impacts

This section describes the visual impacts of the proposed facility, the mitigation proposed by the Company, and the cost and benefits of any additional mitigation options.

1. Description

The Company stated that the proposed facility would be located on a 25-acre site within the contiguous 450-acre properties owned by Brox (Exh. NHE-1, at 4.9-1 to 4.9-2, 4.9-13). The Company indicated that Brox operates a quarry and related industrial facilities on its properties but that much of the land is still forested (id. at 4.9-1). The Company stated that the quarry operation is currently visually buffered from the surrounding community (id.). The Company anticipated that existing terrain and vegetation also would screen views of the proposed project, including its two stacks and major buildings, from most community locations (id. at 4.9-1 to 4.9-2, 4.9-13).

The Company asserted that construction of the stacks for the proposed project as designed would minimize their visual impacts (Exhs. EFSB-V-4; EFSB-V-6). The Company indicated that it proposed to construct two 22-foot diameter stacks at the GEP height of 170 feet, and added that the below-grade placement of the HRSG reduced the GEP stack height from nearly 200 feet to 170 feet (Exh. EFSB-V-4). The Company stated that it considered constructing one 50-foot diameter stack, but noted that the larger diameter of the single stack design would likely increase intrusion into an adjoining wetland buffer area and necessitate relocation of the aqueous ammonia storage tank to a less safe area (id.).

The Company indicated that, in addition to the Brox facilities located immediately to the west of the proposed 25-acre site, other non-residential uses exist in the immediate area,

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[86] (...continued)
facilities, regardless of fuel type or size, to demonstrate that they have minimized solid waste impacts by characterizing the estimated waste stream from the proposed facility, describing the solid waste minimization and recycling strategies proposed for the facility, and as applicable, providing comparisons with statewide policy initiatives and/or governmental or industry guidelines or averages. See Sithe Edgar Decision, 10 DOMSB at 71.

including additional sand and gravel operations to the east and south, and a NEP transmission corridor to the west (Exh. NHE-1, at 4.9-1 to 4.9-2).

At the same time, the Company stated that the area to the north of the Brox properties is primarily agricultural and residential and that other nearby residential uses are located on Wheeler Street to the east and Methuen Street to the southwest; the area to the west beyond the NEP transmission ROW approximately a mile from the proposed facility includes additional agricultural and residential areas (id.). The Company indicated that the residences on Methuen Street are visually and physically separated from the Brox properties by berms at the end of the quarry and by downward sloping terrain (id.).

The Company submitted a study of the likely visibility of the proposed facility from 20 sensitive receptors in the area of the proposed facility (Exhs. NHE-1, at 4.9-1 to 4.9-13; NHE-2, at 5.4-1 to 5.4-11). The Company stated that it first performed a map-based screening analysis, using USGS maps to locate areas within a one-mile radius of the proposed facility from which the facility stacks might be visible, and then conducted a field test of this initial screening (Exh. NHE-2, at 5.4-1 (fig. 5.4-2)).[87] The Company stated that, based on field test results, it selected for detailed study viewsheds of 20 representative residential and public locations with a potential view of the proposed facility stacks (id.).[88]

Based on viewsheds prepared for its selected receptor locations, the Company asserted that the proposed project would be effectively screened from most community locations by existing forested areas and terrain (id. at 5.4-1 to 5.4-11; Exh. EFSB-V-3). The Company indicated that it expected much of the existing woodland around the Brox properties to be

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87 To verify the conclusions of its screening analysis, the Company spot-checked areas within a one-mile radius of the proposed project site where no view of the proposed stacks was expected (Exh. NHE-2, at 5.4-1).

88 The Company indicated that viewshed photographs were taken during winter defoliate conditions in 1999 (Exh. NHE-2, at 5.4-5). At each studied location, the Company recorded compass headings to the stacks, a description of the terrain, vegetation thickness, and the existence of any open areas with potential views toward the proposed project (id.). The Company stated that receptor locations were chosen to provide examples of views of the proposed project from vantage points in all directions (id. at 5.4-1)

preserved in the long term, in part because the wooded areas on the Brox properties to the north and south of the proposed project are protected under the Massachusetts Wetlands Protection Act (Exh. EFSB-V-1). The Company explained that Brox, in its term sheet with Nickel Hill, has committed to the preservation of woodland to the east of the proposed facility, between the proposed project site and Wheeler Street (id.; Exhs. EFSB-V-10; RR-MVRE-7; EFSB-V-10-S, Att.). Nickel Hill explained that it anticipates addressing the implementation of this commitment by means of a written agreement, conservation restriction, or deed restriction to be negotiated with Brox Industries in connection with the anticipated site lease (id.; Tr. 15, at 1910-1911). The Company further indicated that areas to the southwest, west, northwest, and north of the proposed project site, extensively quarried by Brox and bounded by an approximately 20-foot-high berm, are in turn surrounded by land which is currently largely forested (Exh. EFSB-V-1). Nickel Hill stated that the Company's understanding is that Brox intends to confine its operations within the berm, leaving the forested areas intact (id.).

Based on its visual analysis of 20 locations, the Company identified three locations from which unobstructed views of the tops of the stacks would be expected, including a portion of the nearest residential area north of the 25-acre site, located at Rinzee Road in Dracut (3610 feet from stacks), and two locations near River Road in Andover, one to the southeast at Greybirch Road (4430 feet from stacks), and one to the south at the NEP transmission ROW (6890 feet from stacks) (Exh. NHE-2, at 5.4-7 to 5.4-11, 6-9 (figs. 5.4-7, 5.4-18, 5.4-22)). The Company also identified nine locations from which limited views of the tops of the stacks would be expected, including Wheeler and Lowell Streets to the southeast in Methuen (2,130 feet from stacks), four residential locations to the east and southeast near the Merrimack River in Andover (3770 to 4200 feet from stacks), three locations to the west and northwest in Dracut (5,410 to 6,170 feet from stacks), and River Road and Avery Lane to the south in Andover (6,360 feet from stacks) (id. at 5.4-7 to 5.4-11, 6.9 (figs. 5.4-5 to 5.4-24)). The Company explained that, where limited views of the stacks are indicated, the views are based in whole or in large part on the stack tops being visible through tree branches, and asserted that in some of the identified cases the stacks would not be visible at all during foliate conditions (id. at 5.4-7 to 5.4-11, 6-9).

The Company concluded that, based on the extent to which the stacks and other facility

structures would be visible and the nature of the affected sensitive receptor area, Rinzee Road would be the location likely to be most affected by views of the proposed facility and its stacks (Exh. EFSB-V-6). Specifically, the Company noted that both stack tops likely would be visible from a number of residences along the northern portion of Rinzee Road, and that the alignment of Rinzee Road would prevent the development of a complete vegetated screen (id.). To offset the visual impacts identified at Rinzee Road, the Company proposed meeting with northern Rinzee Road residents to arrange for scattered plantings of trees on private property to block potential views of the proposed facility from yards and residences (id.). The Company proposed to plant trees sufficiently in advance of proposed project completion to provide screening to properties from which the proposed facility would likely be visible (id.).

The Company stated that it is required under the terms of its Special Permit to implement, prior to commercial operation, a selective tree planting and replacement program along the northern half of Rinzee Road, subject to the approval of the Board of Selectmen (Exh. EFSB-G-13(d), Att. at 13-14). The Special Permit also requires that the Company undertake selected tree planting to mitigate any views of the facility from residential locations other than the northern half of Rinzee Road, as requested by affected landowners within two years of commercial operation, and with the approval of the Board of Selectmen; provide a vegetated buffer along portions of the 25-acre site access road; provide a plan for preserving the currently existing visual buffering provided by a wooded area off and to the north of the 25-acre site for the operational life of the proposed facility, with the approval of the Board of Selectmen; and arrange for the preservation of 18 acres between the 25-acre site and Wheeler Street in substantially its current state until the completion of demolition or removal of the proposed facility (id. at 12-14).

The Company indicated that it would be willing to discuss with affected landowners visual impact mitigation other than tree planting (Exh. EFSB-V-6). The Company provided a copy of its on-site landscaping plan for the proposed facility and 25-acre site access road, in further support of its contention that visual impacts of the proposed facility would be minimized (Exh. EFSB-G-13, at Appendix F). In addition, the Company indicated that it would use neutral colors for building exteriors, as approved by the Board of Selectmen (Exh. EFSB-G-13(d), Att. at 13).

The Company stated that outdoor lighting would be required to comply with both Dracut and Federal Aviation Authority regulations (Exhs. EFSB-V-6; EFSB-V-8). The Company indicated, however, that the height of all external lighting fixtures would be set at minimum requirements for ground clearance and intensity (Exh. EFSB-V-6). The Company also stated that lighting fixtures would be focused downward to minimize direct line of sight and reflective impact on off-site locations, and that the number of illuminated areas would be limited to the minimum number required for safety and security (id.).

The Company asserted that the proposed facility would not visually affect any areas included in the Massachusetts Landscape Inventory for their scenic value (Exh. EFSB-V-5). The Company stated that the nearest such area, Lake Cochichewick, is approximately nine miles northeast of the proposed facility site, and would be shielded by distance and topography from any potential visual impact of the proposed project (id.).

The Company indicated that the Deer Jump Reservation, an area of open space extending along the south bank of the Merrimack River in Andover, is located at a distance of 3100 feet at the nearest point from the proposed facility site (Exh. AND-4). The Company's map-based screening analysis indicates that the areas in Andover from which the facility would be potentially visible are generally limited to the residential areas above the top of the river bank area, although the potentially affected area extends to within the sloping riverbank area, and closer to the river, from the vicinity of Nollet Drive to Launching Road (Exh. NHE-2, at fig. 5.4-2).[89]

The Company also submitted the results of its assessment of the potential for visible

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[89] The Company's viewshed analysis includes five residential locations from Nollet Drive to Launching Road, representing the area of Andover that parallels the south bank of the Merrimack River to the southeast and east of the facility site, adjacent to the Deer Jump Reservation (Exh. NHE-2, at figs. 5.4-3, 5.4-20 to 5.4-24). Based on the Company's maps and photographs, high terrain on the opposite, north side of the Merrimack River serves as a determinant of the extent to which the facility stacks are visible in some of the viewsheds, those at Winchester Drive, Greybirch Road and Launching Road; for the remaining viewsheds at Nollet Drive and Inwood Lane, intervening terrain on the north bank of the river between the proposed site and the viewpoints is relatively low, and foreground trees represent an important factor for limitation of facility views (id.).

plumes from the stacks and cooling towers of the proposed project (Exhs. EFSB-V-7-S; RR-TD-18(a)-(f)). The Company used the FOG and SACTI models to model visible plumes from the stacks and cooling towers, respectively (Exh. EFSB-V-7-S at 2). The Company applied the FOG and SACTI models using five years (1991-1995) of National Weather Service meteorological data from Logan Airport in Boston (id.). The Company stated its FOG modeling predicted, in aggregate, that under worst case conditions, a stack plume would be visible approximately 47 percent of daylight hours, and that, when visible, the average length of a stack plume would range from 50 to 100 meters (id. at 3). The Company indicated, however, that visible plume frequency and length for the proposed facility should be less than modeled, based on visual observations of other power plant projects (id. at 4). The Company explained that dry low NO_X combustors reduce the volumes of water injected into the combustion turbines to limit NO_X formation (id. at 3).

With respect to cooling tower plumes, the Company stated that its SACTI modeling predicted that a cooling tower plume of some length would be visible at all times (id.). The Company stated that in winter, the season of longest plume lengths, a 188 to 326 meter plume would likely be visible (id.). The Company stated that its SACTI modeling predicted cooling tower plumes of 23 to 27 meters in summer, when plume lengths are shortest (id.). The Company indicated its belief that the SACTI model is a conservative predictor of visible plume frequency (id.). The Company stated that it based its belief on observations of cooling towers made during summer months at existing generating facilities (id.). The Company reported that these observations indicated periods without the presence of a visible plume (id.).

The Company anticipated that no additional visual impacts would result from construction of such ancillary facilities for the proposed project as the 345 kV switchyard and interconnecting transmission lines (Exh. EFSB-V-2). The Company explained that the switchyard would be lower than adjacent buildings, and that existing wooded areas would screen views of the transmission interconnect, including the lines extending from the NEP transmission ROW back to the plant switchyard, from residences to the south, west, and north of the proposed site (id.).

2. Analysis

Nickel Hill has analyzed the potential visual impacts of the proposed facility on the surrounding area, based on a study of views from 20 receptor locations selected based on elevation, proximity, and the potential for unobstructed views of the proposed facility. For each selected visual receptor site, the Company submitted a viewshed with the current view for that location, over which was superimposed a computerized view of the Company's proposed structures. The record demonstrates that the Company used a consistent and reasonable process for identifying areas within a one-mile radius of the proposed facility from which the proposed facility stacks might be visible.

Nickel Hill also has provided a detailed description of land uses in the vicinity of the Brox properties. The record shows that the proposed facility would be constructed on a 25-acre site which is contiguous to Brox properties that are currently used for industrial purposes, and have comparable visual impacts or are zoned for industrial use. The record further shows that the present industrial uses in the vicinity of the proposed project are buffered from other land uses by existing woodland and topography and that the same screening would benefit the proposed facility. The record shows that no areas included in the Massachusetts Landscape Inventory would be visually affected by the proposed facility.

The Company's visual analysis demonstrates that existing forested areas and terrain would effectively screen views of the proposed project from most community locations in the vicinity of the project. However, the record shows that the tops of the facility stacks are likely to be visible from residences along the northern portion of Rinzee Road approximately three-fifths of a mile north of the site, and through branches or near trees tops from other residential locations within a mile to the north, east, and southeast. The record also shows that although also visible from residential areas to the south, west, and northwest, the proposed facility would be a distant feature of views from such areas, over a mile away, and that these facility views also are likely to include other existing industrial and utility facilities; thus any added visual impacts from the proposed facility would be minimal.

Bruton\Vrountas argue that the facility will affect views from the Deer Jump Reservation, extending along the south bank of the Merrimack River in Andover. The record indicates views

of the upper portions of the stacks would be possible from limited portions of the sloping area that rises from the river edge, principally in the area from Nollet Drive to Launching Road. However, terrain along the north side of the river likely would provide significant screening at intermittent points along the potentially affected area.

Nickel Hill has taken a number of design steps to minimize the visual impacts of the proposed facility. In particular, the Company proposes to construct the HRSG at basement level to allow for a reduced-height GEP stack design.[90] In addition, the Company would further mitigate the visual impacts of the proposed facility with landscaping and by selecting neutral colors for building exteriors. The record demonstrates that to mitigate visual impacts of external lighting, the Company would limit the height and number of external lighting fixtures to the minimum necessary both to comply with regulations and to ensure safety and security at the proposed site.

Nickel Hill also has modeled the potential for visible plumes from the proposed facility's stacks and cooling towers. The FOG model predicts that, under worst case conditions, stack plumes would be visible approximately 47 percent of daylight hours and the average length of the stack plume would range from 50 to 100 meters. However, the record shows this prediction may be conservative, since the use of dry low-NO_X at the proposed facility would reduce the volumes of water injected into the combustion turbines with corresponding reductions in plume frequency and length. The record demonstrates that a cooling tower plume of some length is likely to be visible at all times during the winter months, and that shorter, less frequent cooling tower plumes are likely in spring and autumn. The record is inconclusive with respect to the likely length and frequency of cooling tower plumes in summer months: whereas the SACTI model conservatively predicts that plumes would persist throughout the summer, the Company reports periods without visible cooling tower plumes at existing power generation facilities.

Based on the Company's visual study, including viewsheds and associated analysis, the

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[90] The Company also has adopted a two-stack, rather than a single-stack design, primarily to reduce encroachment on a wetland buffer area and to allow optimal siting of an aqueous ammonia tank. The Siting Board concludes that the visual impacts of the two proposed stacks would be substantially similar to those of a larger single stack, particularly given that views of the stacks from most locations would be screened by existing forested areas.

Siting Board concludes that the proposed facility would not significantly change the existing visual character of the 25-acre site and its surroundings. The Siting Board notes the Company's efforts to design its proposed structures in such a way as to mitigate their visual impacts. In particular, the Siting Board notes the Company's location of the proposed project in an area of comparable industrial use with existing vegetative and topographical screening.

The Siting Board also notes, however, that the long-term mitigation of visual impacts from the proposed project depends on maintaining the woodland buffer which surrounds much of the Brox properties. The record shows that the preservation of this buffer depends, in part, on the Company's successful protection of woodland buffer to the east of the proposed facility, between the proposed project site and Wheeler Street, by means of an agreement, conservation restriction, or deed restriction. Accordingly, the Siting Board directs Nickel Hill prior to commencement of construction to submit a copy of the instrument, in recorded form if required, providing for preservation of the 18 acres as a woodland buffer.

Nickel Hill has agreed to meet with residents along the northern part of Rinzee Road to arrange for tree planting on private property in advance of project completion and other visual impact mitigation to screen views of the proposed facility once it is complete. While this approach should address the locations from which the most significant views of the facility are likely, it is possible that additional significant views of the proposed facility may be apparent once construction is complete. In recent decisions, the Siting Board has required proponents of generating facilities to provide selective tree plantings and other reasonable mitigation in residential areas up to one mile from the proposed stack location to mitigate the visibility of the facility and the associated stack. IDC Bellingham Decision, 9 DOMSB at 299-300; ANP Blackstone Decision, 8 DOMSB at 157-158; ANP Bellingham Decision, 7 DOMSB at 180. Consistent with Siting Board precedent concerning the minimization of visual impacts, the Siting Board directs Nickel Hill to provide reasonable off-site mitigation of visual impacts, including shrubs, trees, window awnings, or other mutually agreeable measures, that would screen views of the proposed generating facility and related facilities at affected residential properties and at roadways and other locations within one mile of the proposed facility, as requested by individual property owners or appropriate municipal officials.

In implementing this requirement, the Company: (1) shall provide shrub and tree plantings, window awnings, or other reasonable mitigation on private property, only with the permission of the property owner, and along public ways, only with the permission of the appropriate municipal officials; (2) shall provide written notice of this requirement to appropriate officials and to all potentially affected property owners, prior to the commencement of construction; (3) may limit requests for mitigation measures from local property owners and municipal officials to a specified period ending no less than six months after initial operation of the facility; (4) shall complete all agreed-upon mitigation measures within one year after completion of construction, or if based on a request filed after commencement of construction, within one year after such request; and (5) shall be responsible for the reasonable maintenance and replacement of plantings, as necessary, to ensure that healthy plantings become established.

Accordingly, with the implementation of the above condition, the Siting Board finds that visual impacts of the proposed facility would be minimized.

G. Noise Impacts

1. Description

This section describes the noise impacts of the proposed facility, the mitigation proposed by the Company, and the costs and benefits of any additional mitigation options.

The Company indicated that applicable government regulations include: (1) federal regulations limiting occupational noise exposure; (2) MADEP Policy 90-001 prohibiting tonal sounds and limiting noise increases at property lines and nearest residences to 10 decibels ("dBA")[91] above background levels; and (3) a Dracut noise policy limiting continuously generated sound to 50 dBA at adjacent residences or institutional uses (Exh. NHE-1, at 4.8-4, 4.8-25).

The Company explained that there are various measures of noise, and noted that the

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[91] The designation "dBA" indicates sound measured in decibels using the "A-weighting" network, which, within the range of sounds heard by the human ear, emphasizes middle frequency sounds and de-emphasizes lower and higher frequency sounds (Exh. NHE-1, at 4.8-1).

MADEP 10-dBA limit is based on L_{90} noise, the sound level that is exceeded 90 percent of the time during the measurement period (id. at 4.8-3 to 4.8-4). The Company stated that an increase of 3 dBA is the minimum increase in sound level that is generally perceptible to the human ear (Exh. EFSB-N-6).

In conducting its noise analysis, the Company stated that it measured existing background noise in the vicinity of the proposed project (Exh. NHE-1, at 4.8-4 to 4.8-9).[92] The Company indicated that it selected receptor locations to capture measurements at the nearest sound-sensitive locations in various directions from the site (id.). The Company stated that it compiled L_{90} ambient noise data for daytime and nighttime hours at six receptors under foliate conditions and at the same six receptors plus an additional two under defoliate conditions (id.). The Company then projected likely noise impacts of construction and subsequent operation of the proposed facility on sensitive receptors in the surrounding area (id. at 4.8-9 to 4.8-25). The Company indicated that the lowest measured L_{90} level at each receptor location served as a baseline in the sound impact evaluation for the proposed project (id. at 4.8-9). The Company's noise analysis indicated that daytime baseline L_{90} noise levels in the area surrounding the proposed site ranged from 38 dBA (to the west) to 52 dBA (to the east); nighttime baseline sound levels ranged from 31 dBA (to the southwest, west, and north) to 39 dBA (to the south and east) (id.).

The Company stated that the operation of the proposed facility as designed would result in a maximum increase in L_{90} noise at any existing or potential residential location of 6 dBA at night and 2 dBA during daytime hours (Exh. NHE-1, at 4.8-25).[93] The Company indicated that

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92 The Company stated that Brox Industries operations contributed to daytime weekday noise measurements, but did not affect nighttime or weekend measurements (Exh. NHE-1, at 4.8-8). The Company indicated that roadway traffic, industrial activity, and airplane traffic were the dominant contributors to ambient noise measured in the vicinity of the proposed site (id.).

93 The estimated nighttime increases would be: 6 dBA at receptors R-1 (Poppy Lane to north), R-2 (Wheeler Street to northeast), and R-3 (Wheeler Street to southeast); 4 dBA at receptor R-4 (Route 110 to southeast); and 1 dBA at receptor R-5 (Winchester Drive across Merrimack River to southeast) (Exh. NHE-2, at 5.3-21 to 5.3-25).

the proposed facility as designed would operate in compliance with MADEP's policy limiting noise increases at any sensitive receptor (i.e., nearest residences) to 10 dBA above background levels and with the 50 dBA noise limit established by the Dracut Noise Bylaws (Exhs. INT-MVRE-G-7(d) Bulk Att. at 6-12 to 6-16; NHE-1, at 4.8-25; RR-MVRE-25(b), Att.).[94]

The Company stated that its proposed facility, as designed, would result in L_{90} increases of greater than 10 dBA at certain locations outside of the 25-acre site, but within the boundaries of the Brox properties (Exhs. INT-MVRE-G-7(d), Bulk Att. at 6-12 to 6-16; RR-EFSB-73, Att.).[95] The Company stated that to address these increases Nickel Hill and Brox Industries have negotiated a noise easement, to be executed contemporaneously with their lease agreement, which would allow pure tone emissions and noise increases of more than 10 dBA above ambient on Brox properties (Exh. RR-EFSB-73).[96]

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94 The Company explained that the Dracut bylaws limit continuously generated sound at adjacent residences or institutional uses to 50 dBA at night and 60 dBA during the day; continuously generated sound is limited to 65 dBA at adjacent business uses and 70 dBA at adjacent industrial uses at all times (Exh. NHE-1, at 4.8-4).

95 The Company confirmed that no sound level increases greater than 10 dBA would occur beyond the property lines of the Brox properties (Exhs. INT-MVRE-G-7(d), Bulk Att. at 6-12 to 6-16; RR-EFSB-73, Att.; NHE-1, at 4.8-22, 4.8-25; RR-EFSB-73). To illustrate the extent of noise increases above MADEP's 10-dBA limit, the Company provided a map of the proposed site and surrounding Brox properties with the daytime and nighttime 10 dBA isopleths superimposed (Exh. RR-EFSB-73, Att.). The Company's map indicated that the identified 10 dBA isopleths would lie within the 450-acre Brox properties (id.).

96 The Company indicated that its agreement with Brox Industries would allow on Brox properties noise levels of more than 10 dBA, but less than 40 dBA, above ambient levels, and pure tone emissions resulting from sounds originating from the construction, operation, maintenance, and decommissioning of the proposed facility (Exh. RR-EFSB-73). The Company indicated that the noise easement would cover approximately 280 acres of the Brox properties, exclusive of the 25-acre proposed facility site, and that of these 280 acres, approximately 81 acres and 11 acres would lie within the 10-dBA nighttime and 10-dBA daytime isopleths, respectively (id.). The Company described the area to be covered by the noise easement as extending over that portion of the Brox properties east of the NEP transmission corridor, west of Wheeler Street, south of the northern border of the Brox properties, and north of Methuen Street (id.).

The Company also provided estimated day-night sound levels ("L_{dn}")[97] with the proposed facility, at the residential and property line receptors (Exh. RR-EFSB-36). Based on the Company's estimates, noise levels will be above the EPA guideline of 55 dBA at two residential receptors located southeast of the site: receptor R-4 on Route 110 (60 dBA) and receptor R-3 on Wheeler Street (56 dBA) (id.; Exh. NHE-2, at 5.3-21 to 5.3-22).[98] The estimates show that at the remaining residential receptors and the property line receptors, L_{dn} levels will range from 52 to 55 dBA (Exh. RR-EFSB-36).

The Company indicated that the proposed project as designed would include the following noise mitigation measures: enclosure of the combustion turbines, steam turbines, and HRSGs; use of mufflers for both air inlets and exhaust on the combustion turbines; noise controls to limit cooling tower noise to 48 dBA at a distance of 400 feet; acoustic louvers on ventilation air inlets on the north, east, and south sides; mufflers on roof exhaust fans; enclosure or wrapping of pressure reduction valves and exposed pipes associated with gas metering equipment; purchase of low noise transformer equipment, or, in the alternative, use of noise barrier walls to reduce noise impacts of transformers; and enclosure of circulating water pumps and the water pump station (Exh. NHE-1, at 4.8-24).[99]

The Company presented two options for additional noise mitigation, which would reduce the noise impacts of the proposed facility at the closest residential receptor to 3 and 0 dBA above ambient, respectively (Exh. RR-EFSB-35). The Company estimated the net present value of

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97 L_{dn} is defined as the 24-hour equivalent sound level, with a 10 dBA penalty added to sounds occurring between the hours of 10:00 p.m. and 7 a.m. (Exh. EFSB N-5, Att. at 28). EPA has identified an outdoor L_{dn} of less than or equal to 55 dBA in residential areas as the noise level requisite to protect public health and welfare with an adequate margin of safety for both activity interference and hearing loss (id. at 13).

98 The Company did not provide estimates of existing L_{dn} levels without the proposed facility, but did indicate that the equivalent sound level ("L_{eq}") from the proposed facility would be 33 dBA and 37 dBA at receptors R-4 and R-3, respectively (Exh. NHE-2, at 5.3-25).

99 The Company stated that, with proposed mitigation, the noise increment from the water pump station near Route 110 would not exceed 6 dBA at any residential property line (Exhs. NHE-1, at 4.8-24; RR-EFSB-35, Att.).

added costs and lost economic value associated with each level of additional noise control (Exh. RR-EFSB-35, Att.). The Company indicated that such costs include the capital cost of additional control measures,[100] added fuel cost from losses in thermal efficiency, and the value of lost plant capacity (id.). The Company estimated that the net present value cost to reduce noise impacts from 6 to 3 dBA, and from 6 to 0 dBA, at the residential receptor closest to the proposed project would be $14,406,378 and $28,316,407, respectively, over the cost of the proposed noise mitigation (id.).

The Company also provided information regarding the cost of achieving a 10 dBA increase over ambient noise levels at the 24-acre site line with Brox Industries (Exh. RR-EFSB-74). The Company estimated that achieving this reduction would require additional capital costs of $23 to $24 million and create costs associated with lost capacity and increased fuel consumption with a net present value of over $29 million (id.). The Company stated that the total incremental cost of approximately $50 million is 17 percent of the approximate $300 million capital cost of the proposed facility (id.). The Company asserted that these additional costs would render the proposed project non-competitive in the deregulated New England market (Exh. RR-EFSB-74).

With respect to compliance monitoring, the Special Permit requires that the Company conduct sound compliance measurements commencing within 90 days of commercial operation, including continuous measurements to be taken until the termination of commercial operations at a location as close as possible to the residential receptor north of the site, and periodic measurements to be taken twice in the first year of commercial operation, and once annually for the next five years, at locations as close as possible to the remaining residential receptors (Exh. EFSB-G-13(d), Att. at 19-20). The Special Permit provides for reporting of sound compliance measurements to the Dracut Board of Health (id. at 20).

The Company estimated that construction noise at the nearest residential location,

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[100] Additional noise mitigation measures could include: turbine and HRSG building walls; roof and ventilation fans; vent silencers; gas turbine stack baffles or silencers; the gas turbine air intake filter and silencers; cooling tower noise barriers on intake and exhaust; and step-up transformer noise barriers (Exh. RR-EFSB-35, Att.).

approximately 1,400 feet to the southeast, would range from L_{eq} 49 dBA to L_{eq} 60 dBA,[101] and that the highest predicted construction noise at this location would be associated with excavation and finishing work (Exh. NHE-1, at 4.8-20). The Company indicated that current weekday daytime ambient L_{eq} values at the nearest residence are in the low-to-mid 50s dBA range (id. at Table 4.8-6). The Company indicated that, consistent with the Special Permit, it would mitigate construction noise impacts by limiting major construction activities to a normal construction workday, typically 7:00 a.m. to 3:30 p.m. (Company Brief at 85, citing Exh. EFSB-G-13(d), Att. at 24).[102] Regarding particular construction activities that may be necessary, the Special Permit also requires Nickel Hill to provide prior notification to Dracut officials and others, as identified by the Board of Selectmen, for construction-related blasting, pile driving, and extended concrete pours (Exh. EFSB-G-13(d), Att. at 24).

The Company stated that in addition to normal construction activities, steam and air blows to expel debris from the steamline piping of the proposed facility would occur sporadically during the daytime in the final phases of construction (Exh. NHE-1, at 4.8-20). The Special Permit provides that the Company will mitigate the noise impacts associated with steam and air blows through prior notification of Dracut officials and others, as identified by the Board of Selectmen, and use of temporary portable sound attenuators (Exh. EFSB-G-13(d), Att. at 24-25).

2. Positions of the Parties

MVRE argued that the Company's noise analysis failed to address the combined noise of the proposed facility and existing Brox Industries processing equipment, and that Nickel Hill's position that additional noise mitigation would be too costly fails to take into account (1) the relationship of such costs to overall project cost and (2) the large size of the proposed project

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101 L_{eq} is the designation of the equivalent sound level, in dBA (Exh. NHE-1, at 4.8-3). The L_{eq} is the level of a hypothetical steady sound which would have the same energy (i.e., the same time-average mean square sound pressure) as the actual fluctuating sound observed (id.). The L_{eq} is strongly influenced by occasional loud, intrusive noises (id.).

102 The Company explained that site activity after 4:00 p.m. or on weekends would be limited to clean-up, repair work, inspections, deliveries, and specialty operations (Exh. EFSB-N-1).

relative to other projects reviewed by the Siting Board (MVRE Brief at 13-16).

Andover argued that the Company failed to propose adequate long term noise monitoring and equipment inspection and maintenance procedures to ensure noise levels are as estimated, and failed to provide evidence as to the expected character of noise from the facility including, for example, qualitative descriptions of such noise or recordings of noise from similar facilities (Andover Brief at 9-10).

Bruton/Vrountas argued that the proposed noise levels from the proposed facility significantly exceed MADEP noise limits at the property line, and therefore additional mitigation must be provided (Bruton/Vrountas Reply Brief at 2, 7-8). Bruton/Vrountas further argued that with respect to the Company's noise measurements taken south of the Merrimack River in Andover, the Company measured noise only during defoliate conditions rather than during both foliate and defoliate conditions, and measured noise at a single location that did not reflect the quietest conditions south of the river given the relative presence of highway noise from I-93 (Bruton/Vrountas Supplemental Brief at 3-4).

In response to Bruton/Vrountas, Nickel Hill argued that the choice of a monitoring location south of the Merrimack River was appropriate because it reflected the point on that side of the river closest to the proposed facility (Supplemental Reply Brief at 9). The Company further argued that, given the distance from the proposed facility to the far side of the Merrimack River, a lower assumed background noise level would not result in a noise increase significantly higher than its 1 dBA estimate (id.).[103] The Company noted that noise increases of less than 3 dBA are not noticeable, and therefore asserted that even a slightly higher noise increase for the receptor south of the Merrimack River would represent essentially no noise impact (id.).

3. Analysis

In past decisions, the Siting Board has reviewed the noise impacts of proposed facilities

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[103] For example, the Company calculated that if the background noise for affected areas south of the river were 32 dBA instead of 36 dBA, the combined background and facility noise would be 34 dBA instead of 37 dBA, resulting in an increase of 2 dBA rather than the increase of 1 dBA estimated by the Company (id., citing Exhs. NHE-2, at 5.3-25, table 5.3-10; EFSB-N-6, Att.).

for general consistency with applicable regulations, including the MADEP's 10 dBA standard. Sithe West Medway Decision, 10 DOMSB at 327; Brockton Power Decision, 10 DOMSB at 223; Altresco-Pittsfield, Inc., 17 DOMSC 351, at 401 (1988). In addition, the Siting Board has considered the significance of expected noise increases which, although lower than 10 dBA, may adversely affect existing residences or other sensitive receptors. Sithe West Medway Decision, 10 DOMSB at 327; Brockton Power Decision, 10 DOMSB at 223; Northeast Energy Associates, 16 DOMSC 335, at 402-403 (1987) ("NEA Decision"). The record shows that the proposed facility would meet the most stringent noise restrictions established by the Dracut Noise Bylaws, including a 50 dBA limit for continuously generated sound at adjacent residences or institutional uses. The record also demonstrates that operation of the proposed facility would increase L_{90} noise levels by a maximum of 6 dBA, at the closest residential receptors to the north, northeast and southeast. This maximum residential noise increase of 6 dBA is comparable to or slightly less than the maximum residential noise increases accepted in past Siting Board reviews for locations where the existing noise environment is neither unusually quiet nor unusually noisy. In general, the Siting Board considers noise increases at an already noisy location to be more significant than noise increases in other areas. See Sithe West Medway Decision, 10 DOMSB at 327-328. Most commonly, however, in cases where measured background and calculated facility noise levels at the most affected residential receptors were neither unusually noisy, e.g., as indicated by substantial exceedances of the USEPA's 55-dBA guideline, nor unusually quiet, the Siting Board has accepted or required facility noise mitigation which was sufficient to hold residential L_{90} increases to maximums of 5 to 8 dBA. IDC Bellingham Decision, 9 DOMSB at 311; ANP Bellingham Decision, 7 DOMSB at 190; Berkshire Power Development, Inc., 4 DOMSB 221, at 404 (1996) ("Berkshire Power Decision"); Silver City Energy Limited Partnership, 3 DOMSB 1, at 331, 367-368, 413 (1994) ("Silver City Decision"); NEA Decision, 16 DOMSC at 402-403.

Here, the record shows that the maximum combined facility and background L_{dn} noise level would be 60 dBA at receptor R-4, near Route 110 – a level clearly over the 55 dBA USEPA guideline – and from 52 dBA to 56 dBA at the other residential receptors. However, at receptor R-4, where the modeled combined L_{dn} noise is high, the estimated nighttime L_{90} noise increase

from the proposed facility would be 4 dBA, and the equivalent sound level from the facility would be 33 dBA. The Siting Board concludes that the modeled L_{dn} sound level at receptor R-4 predominantly reflects existing ambient noise, and that the proposed facility would not be a major contributor to noise levels at this receptor.

The record demonstrates that to reduce the maximum residential noise increase to lower levels of 3 dBA and 0 dBA would require additional capital investments of $14.4 million and $28.3 million, respectively. MVRE has argued that additional costs for mitigation must be considered in light of their relationship to total project cost, and the size of the project relative to previous projects reviewed by the Siting Board. While the Siting Board agrees, the identified costs for additional mitigation would represent a significant cost increase in a project with a capital cost of $300 million, and proportionately would be higher than the cost of mitigation options that the Siting Board has determined to be warranted in previous decisions. See IDC Bellingham Decision, 9 DOMSB at 311; Millennium Power Decision, 6 DOMSB at 167; Silver City Decision, 3 DOMSB at 367.[104] Given the significant costs for additional mitigation, and the fact that the estimated maximum residential increase of 6 dBA is clearly within the range accepted in similar cases, the Siting Board finds that no further noise mitigation is warranted to limit noise impacts at residences.

With regard to MVRE's argument that the Company failed to address the combined noise from Brox Industries and the proposed facility, the Siting Board first notes that Brox Industries has conducted quarrying, asphalt batching and other industrial operations at this location for many years, and that these operations are unrelated to the Nickel Hill proposal. Consequently, they are properly considered as part of the existing background noise, rather than as part of the noise attributed to the proposed facility. The Siting Board also notes that Brox operations take place primarily during daytime hours, and therefore generally do not contribute to anticipated

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104 In the cited cases, the Siting Board required additional mitigation to reduce maximum impacts to increases in the range of 5 to 8 dBA, at costs of $500,000 for the 150 MW Silver City Energy Project, $1 million for the 360 MW Millennium Power Project, and $1.4 million for the then-proposed 700 MW IDC Bellingham Project. IDC Bellingham Decision, 9 DOMSB at 311; Millennium Power Decision, 6 DOMSB at 167; Silver City Decision, 3 DOMSB at 367.

nighttime noise levels. Further, the existing and expected L_{dn} noise levels in the Company's analysis, which do reflect noise from Brox Industries, are indicative of community noise levels that do not significantly exceed USEPA guidelines, except at a receptor located southeast of the site near Route 110. The Siting Board therefore finds that noise from the existing Brox Industries operations has been appropriately addressed in the Company's analysis.

With regard to Bruton/Vrountas' argument that the Company's analysis assumes an unrepresentatively high background noise level for the area south of the Merrimack River, the Siting Board agrees with the Company that, even if background noise is assumed to be 32 dBA, rather than 36 dBA at some point south of the Merrimack River, the calculated noise increase at that point likely would not be significantly higher than the Company's 1 dBA estimate. The Company's analysis showed that noise from the facility would be 28 dBA at the receptor chosen to represent the area south of the river that is nearest the site – a level which is lower than the measured nighttime ambient level by a substantial margin. Further, to the extent possible alternative receptor locations south of the river might have reflected lower background noise, such locations likely also would have been more distant from the facility with the result that facility noise also would have been lower. Consequently, the Siting Board finds that the noise impacts of the proposed facility in Andover are accurately represented by the Company's analysis.

The Siting Board notes that operation of the proposed facility would increase noise levels by more than 10 dBA above ambient noise levels at the boundary between the Nickel Hill site and the larger Brox Industries properties. Bruton/Vrountas argue that, given the predicted exceedances of MADEP limits, Nickel Hill must provide additional noise mitigation. However, the record also shows Nickel Hill has negotiated a noise easement with Brox Industries that would allow both noise level increases of more than 10 dBA and pure tone emissions on Brox Industries properties. This noise easement is to be executed contemporaneously with the Nickel Hill/Brox Industries lease agreement. The record shows that no noise level increases greater than 10 dBA would occur beyond the property lines of the Brox Industries properties.

The record demonstrates that an additional capital investment of $23 to $24 million would be required to limit noise increases at the Nickel Hill/Brox property line to no more than

10 dBA, consistent with MADEP Policy 90-001, and that the net present value of the total cost over twenty years (including lost capacity costs and increased fuel consumption) could approach $50 million. The Siting Board notes that this would represent a significant cost increase in a project with an approximate capital cost of $300 million. In light of the industrial zoning of the Brox properties, the agreement which Brox and Nickel Hill have reached as to noise on Brox properties, and the already modest level of noise increases at the nearest residential properties, the Siting Board concludes that limiting noise increases from the proposed facility to a maximum of 10 dBA above ambient at the Nickel Hill property line would not provide sufficient benefit to warrant the significant additional cost. We anticipate that Nickel Hill will seek a waiver of the MADEP property line limit based on the non-residential character of the adjacent off-site areas and the Nickel Hill/Brox Industries noise easement.[105] The Siting Board therefore finds that the noise impacts associated with operation of the proposed facility as designed would be minimized, consistent with minimizing cost of mitigation.

With respect to construction noise impacts, the Siting Board agrees that the Company's proposed mitigation of steam release events and adherence to its proposed construction schedule would help minimize construction-related noise impacts. The Siting Board notes that such practices are consistent with approaches to construction noise mitigation that we have reviewed in recent generating facility cases. The Siting Board therefore finds that the construction noise impacts of the proposed facility would be minimized.

Accordingly, the Siting Board finds that, with the implementation of the proposed mitigation and the noise easement between Nickel Hill and Brox Industries, the noise impacts of the proposed facility would be minimized, consistent with minimizing cost of mitigation.

H. Safety

This section describes safety impacts of the proposed facility, the mitigation proposed by

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[105] The Siting Board notes that several recently-reviewed generating facilities have required a waiver of the MADEP limitation on noise increases at property lines. See Berkshire Power Decision, 4 DOMSB at 205-206; Dighton Power Decision, 5 DOMSB at 246; ANP Bellingham Decision, 7 DOMSB at 186; ANP Blackstone Decision, 8 DOMSB at 167-172; Brockton Power Decision, 10 DOMSB at 223.

the Company, and the costs and benefits of any additional mitigation options.

The Company stated that to help insure safety at the proposed facility it would: (1) adhere to good engineering practices and comply with federal, state and local regulations in its design, construction and operation activities; (2) require its engineering, procurement and construction ("EPC") contractor to have programs in place to ensure compliance with applicable safety and health standards during construction, including an on-site safety engineer for the active phases of the construction process; and (3) employ its affiliate, Constellation Operations Services, to maintain safety and environmental compliance during plant operation (Exh. NHE-1, at 4.12-1). The Company stated that, as part of its commitment to safety at the proposed facility, it would establish comprehensive operating and emergency response procedures, regular safety training and drills, close cooperation with community emergency responders, and an aggressive preventative maintenance program (id.; Tr. 7, at 893 to 896). The Company stated that it would employ highly trained personnel in general and that its plant operators would be licensed (Exh. NHE-1, at 4.12-1).[106]

1. Materials Handling and Storage

The Company indicated that it would store aqueous ammonia on site in a 30,000-gallon welded steel tank (id. at 4.12-2). The Company stated that the tank would be placed within a dike capable of containing 110 percent of the capacity of the tank, and that both the tank and the dike would be leak-tested before use and inspected periodically (id. at 4.12-2 to 4.12-3; Exh. EFSB-S-2). The Company indicated that, to minimize the risk of vehicular damage to the diked tank, the dike would be constructed of concrete reinforced to withstand direct impact from a delivery vehicle at legal speeds (Exh. EFSB-S-2). The Company also stated that the tank would

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[106] MVRE asserted that the Company should be required to provide for comprehensive general liability insurance for the proposed project in the amount of $50 million (Exh. MVRE-DC-1). The Special Permit for the project requires that Nickel Hill obtain the following insurance: environmental impairment liability insurance in aggregate amount of $2 million; public liability insurance in an aggregate amount of $2 million; automobile liability insurance in an aggregate amount of $1 million; and commercial umbrella or excess liability insurance in an aggregate amount of $10 million (Exh. EFSB-G-13(d), Att. at 9-10).

be located to the rear of the proposed facility, away from normal on-site traffic (id.).

The Company provided detailed information with respect to procedures for the delivery of 19 percent aqueous ammonia to the proposed facility (Exh. NHE-1, at 4.12-2 to 4.12-4). The Company stated that its purchase order or contract would specify that ammonia and other chemical delivery occur between 3:00 a.m. and 6:00 a.m., to avoid peak travel hours, and be routed via I-495 and I-93 to Route 110 westbound to the Brox access road (id.; Exh. EFSB-G-13(d), Att. at 22; Tr. 7, at 827-828, 960). The Company anticipated delivery of the ammonia via three 6,500-to-6,750 gallon chemical tanker trucks per week; furthermore, the Special Permit limits ammonia deliveries to a maximum of three per week (Exhs. NHE-1, at 4.12-2 to 4.12-4; EFSB-G-13(d) at 22).

The Company indicated that trucks would be stationed in a bermed unloading area during ammonia transfer, and that the auxiliary plant operator and the delivery driver would stay with the truck throughout the unloading process (id.). The Company also indicated that it would use heavy-duty rubber hoses connected to a permanent pump/pipe system to transfer ammonia, and that trucks delivering ammonia to the proposed facility would be equipped with fast-action shut off valves, and hooked to a line from the top of the ammonia storage tank back to the truck to contain any fumes displaced from the tank (id.). The Company stated that prior to the commencement of operations it would provide written notification of all required delivery procedures to the firm providing the aqueous ammonia (id.). The Company also stated that delivery drivers would receive training in all required procedures, and that procedures would be clearly posted (id.).

The Company anticipated that, in the event of a tank leak or spill, the design of the dike would minimize the exposed surface area of aqueous ammonia solution and, therefore, both the rate of ammonia evaporation and resulting airborne concentrations (id. at 4.12-3; Tr. 7, at 820). The Company explained that the open interior of the dike would be filled with a layer of buoyant plastic spheres which would float on the surface of any ammonia released into the dike (Exh. NHE-1, at 4.12-3; Tr. 7, at 951). The Company indicated that a level gauge on the tank, monitored from the control room, would further reduce the likelihood of an ammonia release (Exh. NHE-1, at 4.12-3). The Company stated that a sudden drop in the level of ammonia in the

tank would activate an alarm and trigger the implementation of emergency response procedures (id.).

The Company assessed the potential for off-site impacts from the possible rupture of the ammonia storage tank wall under worst-case meteorological conditions (Exh. NHE-2, at 5.2-32). The Company indicated that this constituted a worst-case ammonia release scenario (id.). The Company stated that, based on protocols established in Offsite Consequence Analysis Guidance published by the EPA in 1996, it used an ammonia concentration of 200 ppm as the "toxic endpoint" to determine the extent of surrounding area over which impacts of an accidental release represent a worst-case consequence (id. at 5.2-34). The Company calculated that were the storage tank to fail completely, ammonia concentrations of 200 ppm or higher could occur at distances of up to 317 feet from the tank (id. at 5.2-32 to 5.2-34).[107]

The Company indicated that the closest residence would be 1300 feet to the northeast of the ammonia tank, and therefore outside the radius of potential impact should a catastrophic ammonia spill occur (id. at 5.2-34; Exh. EFSB-S-1). The Company indicated that the closest publicly accessible property boundary distance, 689 feet to the east of the tank, would likewise be out of range (id.; Exh. EFSB-S-5). The Company stated that the radius of potential impact would extend beyond the proposed project fenceline to adjoining Brox property, but indicated that wetlands cover large portions of the affected area, including the pond and wetland system to the southeast and a band of wetlands within the wooded land to the east and northeast (Exhs. EFSB-S-1; NHE-2 (fig. 5.8-2)). The Company added that Brox employees do not use the affected location in conjunction with Brox mining operations (Exh. EFSB-S-1). The Company asserted, therefore, that the proposed facility as designed would afford the public adequate protection (Exh. EFSB-S-1; Tr. 7, at 819 to 823).

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[107] The Company explained that an ammonia concentration of 200 ppm is the level up to which nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action (Exh. EFSB-H-6). For levels between 25 ppm and 200 ppm, the Company cited criteria indicating that individuals may experience strong odor and temporary eye and throat irritation and an urge to cough; the criteria further indicate that at levels up to 25 ppm, individuals may experience some odor but no significant irritation (id.) (See Section III.L, below).

The Company presented information regarding the construction cost for its proposed ammonia storage facilities, and the additional costs associated with possible construction of a building over the ammonia tank and containment dike to provide further mitigation of impacts of a catastrophic ammonia spill at its proposed facility (Exh. EFSB-S-1; Tr. 7, at 819 to 823).[108] The Company estimated the cost of constructing the proposed ammonia storage facilities at $670,000 (Exh. RR-EFSB-28). The Company stated that this estimate incorporated costs of a 30,000 gallon tank plus associated equipment, including piping, valves, transfer pump, instrumentation and control, and installation (id.). The Company's estimate of ammonia storage costs also included the cost of constructing a reinforced retention dike sized to hold 110 percent of the tank capacity, with slab and sump pump (id.). With regard to a possible enclosure for the ammonia tank and containment dike, the Company indicated that the additional cost, including a steel frame, siding, locking entry door and roof, would be approximately $26,000, but that ancillary equipment, including an ammonia vapor scrubbing system, monitors and alarms, would involve additional expenditures (id.).

In response to an intervenor request, Nickel Hill modeled a hypothetical accidental spill of aqueous ammonia during transportation along I-93 in Andover (Exhs. INT-MVRE-A-2, INT-MVRE-A-2-S; INT-MVRE-A-2-S2; Tr. 7, at 956-968). The Company stated that, using conservative and reasonable assumptions, it analyzed an ammonia release resulting from the breach of a tanker and spillage of an entire 6,500 gallon load onto the highway within one hour (id.). The Company explained that it simulated the effects of the spill based on requested meteorological assumptions it considered unlikely given the planned early morning delivery time, including an ambient temperature of 90 degrees Fahrenheit ("F"), a relative humidity of 80 percent, and a roadway temperature of 122 degrees F (Exh. INT-MVRE-A-2-S2). Nickel Hill made additional assumptions that it determined were reasonable regarding flowage of ammonia to catch basins along I-93, which would serve to reduce the levels of airborne ammonia resulting

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[108] The Company indicated that construction of a building over the ammonia tank and containment dike would likely provide additional mitigation of impacts of a catastrophic ammonia spill, but that the resulting mitigation might be minimally felt beyond the Brox properties fenceline; only the adjoining Brox properties would likely be affected (Tr. 7, at 820 to 821).

from the spill (id.; see Exh. INT-MVRE-A-2-S, at 5; Tr. 7, at 961; Hearing Officer's Ruling of December 15, 1999, at 3). Nickel Hill reported that, based on the requested analysis, the toxic endpoint of a 200 ppm ammonia concentration would extend to a maximum of 581 feet from the source of the spill under average wind and atmospheric stability conditions, and a maximum of 2112 feet under worst-case wind and atmospheric stability conditions (Exh. INT-MVRE-A-2-S, at 5).

As an alternative to the proposed ammonia system, the Company identified the option of installing an ammonia-on-demand ("AOD") system using urea to generate ammonia on-site, but noted that to date the system has not been demonstrated in an SCR system (Exh. INT-MVRE-G-7(d), Att. at 5-8 to 5-10). The Company explained that an AOD system currently is being installed as part of a new SCR system at the Canal Station Unit 1, and also is included in the design for the proposed repowering of Canal Station Unit 2 (id. at 5-9).[109] The Company intends to maintain communication with the supplier of the AOD system at Canal Station, in order to monitor its performance (id. at 5-10).

The Company indicated that, given the newness of the AOD system and the need for extremely high reliability, the AOD system supplier has recommended that a 10,000 gallon backup aqueous ammonia storage tank and vaporizor be included as part of a possible AOD system at the proposed facility (id.). The Company added that with the identified backup aqueous ammonia system, the installation cost of an AOD system would be $2.3 million greater than that for a conventional aqueous ammonia system, and that the total annual costs for the AOD system, including capital and operating costs, would be $1.40 million, or $0.63 million greater than that for a conventional aqueous ammonia system (id.; Exh. RR-TD-21). The Company noted that, while more expensive, the AOD system would essentially eliminate the need for transport of aqueous ammonia, and would reduce but not eliminate the need for on-site storage of aqueous ammonia (Exh. INT-MVRE-G-7(d), Att. at 5-10). The Company stated that later in the design process, it would determine in consultation with its EPC contractor whether to install an AOD system based on the then-available information as to emissions control

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[109] The Siting Board is currently reviewing the proposed Canal Unit 2 repowering project in Southern Energy Canal III, L.L.C., EFSB 98-9.

effectiveness, operating reliability, and cost (Tr. 18, at 2126-2127, 2183-2186).

The Company stated that operation of the proposed facility would require limited amounts of lubricating oils and other industrial chemicals, primarily for water and wastewater treatment, and for operation of the SCR system (Exh. NHE-2, at 5.12-6). The Company indicated that all on-site chemical storage would be in covered containment areas, with secondary containment appropriate to each chemical (id.).

Andover argued that, in choosing SCR rather than a zero ammonia technology such as $SCONO_X$, the Company placed convenience and cost ahead of the benefits to local residents of eliminating the need to transport, store and use large volumes of aqueous ammonia at the proposed facility (Andover Brief at 7). MVRE and Bruton/Vrountas asserted that with use of SCR, aqueous ammonia would be trucked on roads troubled by high accident rates, through and near residential neighborhoods (MVRE Reply Brief at 21; Bruton/Vrountas Brief at 3). Bruton/ Vrountas argued that the Company only considered a "best possible case" ammonia accident scenario, and that a full risk analysis should be performed for the proposed use of SCR with aqueous ammonia (Bruton/Vrountas Brief at 4).

The Company maintained that it had shown ammonia would be transported to the site and unloaded in a manner that minimizes impacts, that it had performed a thorough and credible analysis of a hypothetical accidental release of aqueous ammonia during transport, and that it had demonstrated that even under extreme and implausible conditions a full tanker ammonia spill would not pose an extensive safety threat (Company Reply Brief at 25, citing Exhs. INT-MVRE-A-2; INT-MVRE-A-2-S; INT-MVRE-A-2-S2).

2. Fogging and Icing

The Company submitted predictions of fogging and icing likely to result from proposed facility operation (Exh. EFSB-A-2-S, Att. at 6-22 to 6-26). To generate its predictions, the Company applied the SACTI model to five years of actual and modeled meteorological data for the area of the proposed project (id.).

Based on its analysis, the Company anticipated that episodes of fogging would occur at five roadway locations, but would last no more than a total of three hours per year at all locations

except at Lowell Street, 300 meters to the south-southeast of the cooling tower (id.). The Company predicted eight hours of fogging per year at Lowell Street (id.). The Company stated that the fogging episodes predicted by SACTI would occur during high relative humidity and wind speed conditions greater than 10 meters per second (id.). The Company indicated that such conditions transport the plume to the ground and are generally associated with precipitation events such as rain or snow (id.).

The Company also anticipated, based on its analysis, that icing associated with the proposed cooling tower operation would occur less than three hours per year on average (id.). The Company stated that its SACTI modeling predicted that episodes of icing would occur with greatest frequency when winds blew from the west, northwest or north during winter months (id.).

The Company asserted that actual impacts of fogging and icing would be less than predicted because its model conservatively (1) includes nighttime hours, precipitation, snow and naturally occurring fog conditions, and (2) does not consider reductions in fogging and icing due to plume mixing as the plume drifts over other facility structures (id.).

3. Emergency Response

The Company indicated that it would prepare both a spill prevention plan and an emergency response plan for its proposed project in conjunction with Dracut (Tr. 7, at 893 to 896). The Company expected to have both plans in place before initial delivery of chemicals to the site of the proposed project prior to commercial operation (id. at 895 to 896).

The Company stated that its proposed project, which would use 19 percent aqueous ammonia, would not require preparation of an EPA-mandated Risk Management Plan ("RMP") (Exh. NHE-2, at 5.12-5). The Company explained that EPA requires an RMP of facilities using significant quantities of 20 percent aqueous ammonia (id.). The Company indicated that, though exempt, it would nonetheless voluntarily prepare an RMP for its proposed project in response to a request by the Dracut Utility Environment Committee (id.). The Company indicated that typical components of an RMP include specification of the amount of material stored on-site; accident history; plans for emergency response, including arrangements with responding

agencies; and publication of accidental release modeling results (id.).

With respect to potential safety impacts of the proposed facility and their mitigation, the Company also cited conclusions in the Special Permit (Exh. EFSB-G-13(d), Att.). In the Special Permit, the Board of Selectmen indicated its expectation that storage and handling of chemicals at the proposed facility as conditioned and as planned by the Company would minimize the risk of fires and other hazards and ensure that appropriate measures to manage those risks would be in place (id. at 5 to 6).

4. Blasting

In response to concerns raised by MVRE, the Company addressed safety issues associated with blasting by Brox in the vicinity of the proposed project. The Company stated that blasting within 50 feet of the gas pipeline for the proposed facility would be prohibited (Exhs. EFSB-G-13(d), Att.; RR-EFSB-29; RR-MVRE-7; Tr. 7, at 831-832). In addition, the Company indicated that it would supervise and review the size and design of any blasting in proximity to its gas lines to ensure that the blasting would have no effect on these lines (Exh. RR-MVRE-7; Tr. 7, at 832).

5. Analysis

The record demonstrates that aqueous ammonia and other non-fuel chemicals would be properly managed and stored, in accordance with applicable public and occupational safety and health standards. The record shows that the 19 percent concentration of aqueous ammonia which the Company plans to use in its proposed facility would not be subject to regulation under the EPA's Risk Management Program, but that the Company has made a commitment to develop an RMP in response to a request from Dracut. The record also demonstrates that, in conjunction with Dracut, the Company will develop both a spill prevention plan and an emergency response plan for its proposed facility. The record further demonstrates that no blasting would be allowed within 50 feet of the gas pipeline for the proposed facility. The record also shows that the Company will supervise and review the size and design of any blasting in proximity to its gas lines to ensure that the blasting would not affect these lines.

With respect to use of aqueous ammonia at the site, the Company's modeling results

demonstrate that in the event of a release from a rupture of the ammonia tank under worst-case conditions, aqueous ammonia concentrations at all points along the Brox properties boundary would be less than the 200 ppm guideline set by EPA. Concentrations of 200 ppm or more, the toxicity threshold used in the Company's analysis, would extend under worst-case conditions to 317 feet from the ammonia storage tank, including locations up to approximately 165 feet beyond the eastern boundary of the 25-acre site but within the Brox properties.

The record shows that the affected off-site areas in the Company's analysis, including a pond and wetland system to the southeast and woods with some wetlands to the east and northeast, lie fully within property of Brox Industries and are not used by Brox Industries employees. The Company proposes to install fencing to the east and north of the portion of the Brox properties adjacent to Wheeler Street. However, the overall Brox Industries properties comprise 450 acres and contain significant areas of wooded land along and within other portions of the boundary, including the western, northern and southeastern boundary areas. The Siting Board notes that if Nickel Hill wished to fully secure the off-site area subject to ammonia release effects, it would need to fence more than the area adjacent to Wheeler Street, and additionally would need to closely monitor and maintain the fencing that it does install to ensure its continuing effectiveness.

The Siting Board notes that, in additional areas beyond those potentially affected by the worst-case consequences in the Company's analysis, the identified ammonia release would result in concentrations of between 25 ppm and 200 ppm, from which individuals could experience strong odor and irritation. In a recent generating facility review, the Siting Board considered whether there was likely to be off-site exposure to concentrations of less than 200 ppm, from which individuals might experience odor and irritation. See IDC Bellingham Decision, 9 DOMSB at 317-318, 320. Here, the record does not establish whether ammonia concentrations would be limited to levels below those which potentially cause odor and irritation, at nearby locations outside the Brox properties boundary and on portions of the Brox properties occupied by Brox employees.

With respect to the Company's analysis of a hypothetical ammonia spill from a tanker truck accident on I-93, the record shows that assuming spillage of an entire tanker load within

one hour, ammonia concentrations of 200 ppm or more would extend to a maximum distance of nearly 2112 feet. The Siting Board concludes that the Company's transport spill analysis included conservative assumptions about temperature, wind, and stability conditions, and reasonable assumptions as to the likely size of the pool of spilled ammonia given flowage away from the pool via catchbasins.

In past generating facility reviews, the Siting Board has accepted use of aqueous ammonia systems with plans for ammonia delivery and usage comparable to those proposed by Nickel Hill. Here, the record shows that the Company's ammonia delivery plans include a limited number of tanker deliveries – three per week – confined to a limited early morning period when light traffic conditions are expected. However, the Company's analysis of a transport-related ammonia spill shows the potential for ammonia concentrations of 200 ppm up to 2112 feet, which could affect residential, commercial, and public areas.

While the likelihood of a tanker truck accident similar to the one analyzed is small, the Company's plans to use a conventional aqueous ammonia system warrant inclusion of ammonia transport safety as part of its emergency response planning for the project. The Siting Board therefore directs the Company, as part of its development of emergency response plans for the facility, to identify in cooperation with Dracut and Methuen steps to address possible ammonia tanker truck delivery accidents along the planned tanker delivery route between the I-93/Route 110 interchange and the proposed site.

Nickel Hill has indicated that it may decide during the project design stage to install an AOD system with a 10,000 gallon tank to store a backup supply of aqueous ammonia, rather than a conventional aqueous ammonia system with a 30,000 gallon storage tank. Use of an AOD system would essentially remove potential safety impacts from aqueous ammonia transport, and reduce such potential impacts from on-site ammonia storage. While a worst-case ammonia release was not modeled for the AOD system, use of the smaller 10,000 gallon tank likely would further reduce the extent of any off-site areas subject to effects from such releases.

The Company has committed to further consider the option of using an AOD system as project design progresses, and indicated that it may well proceed with such a system assuming performance comparable to a conventional system can be demonstrated, and the expected costs,

although higher than those for a conventional system, are not unacceptably high at that time. To allow the Siting Board to remain informed as to the Company's choice of an ammonia system, the Siting Board directs the Company, prior to commencement of construction of such ammonia system, to provide an update to the Siting Board on its evaluation of the performance and relative cost for an AOD system, and its plans for installing a conventional or alternative ammonia system as part of the SCR design based on evaluation of performance and cost.

The Company also identified the option of constructing a building over the ammonia tank and containment dike, which likely would provide additional mitigation of the impacts of a worst-case ammonia spill. The record demonstrates that the cost of enclosing ammonia storage facilities for the proposed project would be approximately $26,000 above the $670,000 for the ammonia storage facilities themselves, plus the cost of ancillary equipment, including an ammonia vapor scrubbing system, monitors and alarms.

In recent power plant cases reviewed by the Siting Board, applicants have proposed to install aqueous ammonia storage tanks that were either double-walled or enclosed. Brockton Power Decision, 10 DOMSB at 226; Sithe Edgar Decision, 10 DOMSB at 97; IDC Bellingham Decision, 9 DOMSB at 317-318; Sithe Mystic Development LLC, 9 DOMSB at 166-167 ("Sithe Mystic Decision"); ANP Blackstone Decision, 8 DOMSB at 179; ANP Bellingham Decision, 7 DOMSB at 203.[110, 111] Here, the use by Nickel Hill of either an enclosure for the ammonia

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[110] Four of the applicants provided modeled maximum off-site ammonia concentrations from a worst-case spill, with the proposed mitigation for their projects, which ranged from less than 0.5 ppm to 29.5 ppm. Brockton Power Decision, 10 DOMSB at 226-227; Sithe Edgar Decision, 10 DOMSB at 98; IDC Bellingham Decision, 9 DOMSB at 317-318; Sithe Mystic Decision, 9 DOMSB at 167.

[111] In three of these previous cases, applicants proposing use of containment structures for ammonia storage tanks provided estimates of worst-case ammonia concentrations indicating that, even without containment structures, property line concentrations would have been well under 200 ppm. IDC Bellingham Decision, 9 DOMSB at 318; ANP Blackstone Decision, 8 DOMSB at 179; ANP Bellingham Decision, 7 DOMSB at 203. The maximum modeled concentrations without use of containment structures would have been 200 ppm at a distance of 317 feet from the IDC Bellingham facility's ammonia storage tank, well short of the nearest facility property line located at a distance of

(continued...)

storage tank, or other mitigative design such as a double-walled tank, would provide an additional level of safety for individuals who may access the area of Brox properties subject to ammonia concentrations of 200 ppm or more, the worst-case consequences in the Company's analysis, or who may be in other portions of the Brox properties or in off-site areas along Wheeler Street where they may experience odor and irritation from the worst-case ammonia release scenario. Based on the Company's estimates, the cost of enclosing the ammonia storage tank would be reasonable. We note that, should the Company implement an AOD system as discussed above, use of an enclosure for the ammonia storage tank or double-walled tank likely would not be warranted.

Therefore, to provide an additional level of safety in the event of a spill from the ammonia storage tank, the Siting Board directs that Nickel Hill enclose the ammonia storage tank or incorporate an alternative design such as a double-walled tank to mitigate the impacts of any potential ammonia spill, unless Nickel Hill determines that it will install an AOD system. To allow the Siting Board to remain informed as to the Company's final design for the ammonia storage tank, the Siting Board directs the Company, prior to commencement of construction of the ammonia system, to provide an update to the Siting Board on the Company's plans to enclose the ammonia storage tank or use an alternative design as part of the SCR design.

The record identifies areas potentially affected by cooling tower fogging and icing and characterizes meteorological conditions when fogging and icing might occur. The record also demonstrates that the Company's analysis is conservative and that fogging and icing are likely to pose an infrequent problem in the vicinity of the proposed project. The record shows, however, that the Company has not proposed a plan for mitigation of fogging and icing on roadways in the area surrounding the proposed facility, as needed. The Siting Board therefore directs Nickel Hill to monitor fogging and icing in the vicinity of the proposed facility and, as necessary, establish a plan in cooperation with appropriate local officials to deice or sand iced roadways and alert motorists and residents concerning any project-related fogging or icing episodes affecting public

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[111] (...continued)
1500 feet from the storage tank, and would have been 79 ppm and 42 ppm at the property lines of the ANP Blackstone and ANP Bellingham facilities, respectively. Id.

safety.

Accordingly, the Siting Board finds that, with the implementation of the proposed mitigation and the above conditions, the safety impacts of the proposed facility would be minimized.

I. Traffic

This section describes the impacts of construction and operation of the proposed facility on local traffic conditions and outlines proposed mitigation of traffic impacts.

1. Description

The Company asserted that traffic impacts associated with the construction and operation of the proposed facility would be minimized (Company Brief at 98 to 99). In support of its assertion, the Company provided data on existing traffic conditions, and modeled future traffic levels of service ("LOS") with the proposed facility in Year 2001 and Year 2004, and without the proposed facility in Year 2004 (Exhs. NHE-2, at 5.11-1 to 5.11-19; EFSB-T-5; EFSB-T-6; EFSB-T-11(a), Att.; EFSB-T-11(b), Att.; EFSB-T-11(c), Att.; EFSB-T-11(d), Att.).[112]

The Company's analyses focused on the Route 110 intersection with the Brox access road[113] and the Route 110/Route 113 intersection about two miles to the northeast (Exh. NHE-2, at 5.11-1; Tr. 7, at 834). The Company collected automatic traffic recorder counts ("ATR") in March 1999 at two Route 110 locations, (1) west of the Brox access road and (2) west of Route 113 (Exh. NHE-2, at 5.11-5). Based on these counts, the Company determined that peak

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[112] The Company's Year 2001 traffic modeling identified and located increases in traffic from construction of the proposed facility (Exhs. NHE-2, at 5.11-11 to 5.11-13, at Appendix D; EFSB-T-5; EFSB-T-6; EFSB-T-11(c), Att.; EFSB-T-11(d), Att.). The Company's Year 2004 traffic modeling identified and located increases in traffic from operation of the proposed facility (Exh. NHE-2, at 5.11-13 to 5.11-17, at Appendix D).

[113] The Company asserted that the proposed relocation of the entrance to the Brox access road from Route 110 should not affect its traffic analyses, since there are no roads or intersections between the current and proposed entrances (Exh. EFSB-G-13(e); Tr. 7, at 834 to 835).

commuter traffic periods in the vicinity of the project site are from 7:00-8:00 a.m. and 4:00-5:00 p.m. (id.). The Company also collected six-hour peak period manual counts of turning movements and vehicle classifications at the Route 110 intersections with the Brox access road and Route 113 in Methuen (id.).

The Company compared its March 1999 ATR data with Massachusetts Highway Department annual average traffic volumes in the vicinity of the proposed site (id. at 5.11-5).[114] The Company indicated that the annual average traffic volumes were approximately seven percent higher than the observed traffic count data from its March 1999 study (id.). The Company stated that it therefore adjusted its observed traffic count data upwards by seven percent to reflect average traffic conditions (id.). The Company stated that additional adjustments were made to reflect increases in truck traffic during peak operation of an existing asphalt batching plant on the Brox property near the proposed project site (id. at 5.11-5 to 5.11-6). The Company's adjustments to traffic count data also incorporated a projected annual area growth rate of three percent (Exh. NHE-1, at 4.10-6).

In modeling Year 2001 construction traffic impacts, the Company anticipated a maximum construction-related workforce of 300 during a total construction period of 18 to 24 months (id. at 5.11-9). The Company stated that its traffic analysis assumed that seventy percent of the workers would make trips within peak commuter traffic hours,[115] and that each worker would drive alone and make an average of 2.5 trips per day to or from the construction site (id.). The Company anticipated that trucks delivering construction materials and equipment would average 40 trips per weekday to or from the proposed facility site during the project construction period (Exh. EFSB-T-5). The Company assumed that 10 of these truck trips would occur during each of the morning and afternoon peak commuter traffic hours (id.). However, the Company stated that

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[114] For annual average traffic volumes in the area of the proposed site, the Company relied on data collected at the two closest appropriately located Massachusetts Highway Department permanent traffic count stations, Station 21 in Tyngsborough on Route 113 and Station 12 in Haverhill on Route 110 (Exh. NHE-2, at 5.11-5).

[115] The Company asserted that its assumption was conservative, given its expectation that the majority of construction workers would arrive prior to 7:00 a.m. and depart at approximately 3:30 p.m. (Exhs. NHE-2, at 5.11-9; RR-TD-14; Tr. 7, at 871 to 874).

construction phase deliveries would be scheduled during off-peak hours, to the extent possible (id.).

The Company's traffic analysis indicated that the intersection of Route 110 with Route 113, rated at LOS B,[116] would be largely unaffected by the addition of construction-related traffic (Exh. NHE-1, at 4.10-12, 4.10-17). However, the Company indicated that the intersection of Route 110 with the Brox access road currently is at LOS D during morning and afternoon peak hour traffic, and that vehicles exiting the Brox access road might experience a further decrease in LOS during construction of the proposed facility (id.). The Company proposed stationing a police officer at the intersection of the Brox access road with Route 110 to control traffic flow at that location (id.). The Company indicated that other possible steps to control traffic at the Brox access road/110 intersection include: (1) constructing a right turn deceleration lane onto the Brox access road; (2) warning motorists of construction with high visibility signs along the Route 110 approaches to the Brox access road; and (3) restriping the northbound approach to the Brox access road to create a left turn or bypass lane (id.).

The Company also discussed the effect that construction of the proposed facility's water intake system, water line, and sewer line would have on traffic along Route 110 (Exhs. EFSB-T-9; Tr. 5, at 674 to 678; RR-EFSB-24; RR-EFSB-25). The Company indicated that a segment of the 24-inch diameter water supply line for the proposed facility would run from the wet well/pumphouse westerly to Route 110 at a depth of four feet (grade to top of pipe), then along the edge of Route 110, within the existing MHD ROW, to the proposed relocated Brox access road (Exhs. EFSB-T-9; Tr. 5, at 674 to 678; RR-EFSB-24; RR-EFSB-25). The Company stated that Route 110 at this location is wide enough to allow for reduced speed two-way traffic during pipe installation (Exhs. EFSB-T-9; Tr. 5, at 674 to 678; RR-EFSB-24; RR-EFSB-25). The

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[116] The Company explained that LOS, defined over six categories from A (optimum/free flow) to F (high congestion), is a qualitative measure of roadway operating conditions (Exh. NHE-1, at 4.10-12). A variety of factors contribute to an LOS rating which include, but are not limited to, roadway geometry, travel speed and length of delays, and freedom to maneuver (id.). The Company stated that LOS C, a condition of stable flow, or better is considered desirable for peak or design flow in rural areas and LOS D is considered acceptable in urban areas (id.).

Company proposed temporary restriping of the roadway and a police detail to ensure safe passage of traffic during the approximately one to two weeks needed to install the water line (Exhs. EFSB-T-9; Tr. 5, at 674 to 678; RR-EFSB-24; RR-EFSB-25).

In addition, the Company indicated that a 4-inch diameter sewer line for the proposed facility would begin at a lift station at the northeast corner of the Brox access road/Route 110 intersection, then cross beneath the highway to the south shoulder of Route 110 (id.). From this point, the sewer line would run westerly along the south shoulder of Route 110 for approximately 4,300 feet to an existing manhole (id.). The Company stated that, as in the case of the water supply line, temporary restriping of Route 110 would allow for reduced speed two-way traffic (id.). The Company indicated it would arrange for a police detail for the two to three week period needed to install the sewer pipe (id.). The Company indicated that installation of the sewer line segment from the Brox access road/Route 110 intersection beneath Route 110 to its south shoulder would involve trenching (id.). The Company stated, however, that trenching would require no more than two days to complete and would block no more than half of Route 110 at any given time (id.).

The Company provided information from Dracut regarding school bus routes in the vicinity of the proposed facility site (Exh. EFSB-T-8, Att.). This information indicated that school buses pick up students in the area from 6:30 a.m. to 7:15 a.m. and from 8:10 a.m. to 8:35 a.m., and that return trips begin at 1:45 p.m. and at 3:00 p.m. (id.).

The Company also examined traffic impacts associated with the operation of the proposed facility changes by modeling projected Year 2004 LOS with and without the proposed facility (Exh. NHE-2, at 5.11-17). The Company assumed that, once in operation, the proposed facility would require a staff of twenty distributed over three shifts of twelve, six, and two employees, and that each employee would make an average of three daily trips to or from the proposed facility (Exh. NHE-1, at 4.10-13). The Company also stated that operation of the proposed facility would require several truck deliveries per week, and indicated that it would schedule these deliveries for off-peak hours to the extent possible (id.).[117] The Company

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[117] The Company estimated that operation of the proposed facility would require an average (continued...)

estimated that with the proposed project in operation, peak-hour traffic to the north and south of the proposed facility site along Route 110 would increase by a maximum of nine vehicles (Exh. NHE-2, at 5.11-15). Given these assumptions, the Company projected that Year 2004 traffic exiting the Brox access road onto Route 110 would experience LOS E with or without the proposed facility in operation (id. at 5.11-17). The Company anticipated that levels of service for all other traffic study sites would remain unchanged at LOS B or better (Exhs. NHE-1, at 4.10-12, 4.10-17).

The Company examined accident data for the period 1995 to 1997 for intersections in the traffic study area (Exh. NHE-2, at 5.11-6). The Company indicated general regional concern with respect to accidents along the Route 110 corridor, and reported one accident on Route 110 at the Brox access road for the years of its analysis (id.). The Company analyzed the sight lines of vehicles entering or exiting the Brox access road at its intersection with Route 110 and determined that, for an approach speed of 45 miles per hour, the intersection currently exceeds the minimum stopping sight distance requirements of 325 feet in both directions (id. at 5.11-18; Tr. 7, at 836). The Company noted that present corner sight distances, approximately 350 feet to the east and 650 feet to the west, would be improved to 1100 feet in both directions with the proposed relocation of the Brox access road entrance (id.).

Nickel Hill also submitted a copy of its Special Permit, which includes a number of conditions intended to minimize the traffic impacts of the proposed facility (Exh. EFSB-G-13(d), Att. at 23-26). Specifically, the Special Permit requires that the Brox access road be relocated, and that Methuen Street be widened from its intersection with the Brox access road to its intersection with the 25-acre site access road, before a building permit for the proposed project will be issued (Exh. EFSB-G-13(d), Att. at 23). The Special Permit also makes provision for warning signs on Route 110 and Methuen Street and for uniformed officer control, and sets specific work schedules (id. at 23-24). The Special Permit concludes that traffic would increase very little with operation of the proposed facility as conditioned; that the relocation of the Brox

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[117] (...continued)
of four truck trips (entrances or exits) over a 24-hour period, all scheduled during off-peak traffic hours (Exh. NHE-1, at 4.10-14).

access road would resolve the largest single traffic hazard associated with proposed project construction and operation; and that the timing of work shifts set forth in the Special Permit would minimize impacts on existing traffic congestion during construction of the proposed facility (id. at 23-24; Dracut Brief at 17).

2. Analysis

Nickel Hill has provided an analysis of the impacts of facility construction and operation on traffic conditions in the vicinity of the proposed facility site. The record demonstrates that operation of the proposed facility would create minimal additional traffic, and that traffic conditions as measured by LOS would be unaffected by this operational traffic. Further, Dracut has found that traffic safety in the vicinity of the Brox access road would likely improve with the road's relocation and that traffic would increase very little with operation of the proposed facility as conditioned in the Special Permit. Consequently, the Siting Board finds that the traffic impacts of operation of the proposed facility would be minimized.

With respect to construction traffic impacts, the record demonstrates a reduction in LOS at one location, the intersection of the Brox access road with Route 110. The Company has proposed stationing a police officer at this intersection to control traffic flow, and also has indicated that it is prepared to consider additional mitigation measures including: (1) constructing a right turn deceleration lane into the Brox access road; and (2) restriping the northbound approach to Brox Industries Drive to create a left turn or bypass lane. The Special Permit requires posting of approved signs warning of construction along Route 110 both east and west of the Brox access road. In addition, the Special Permit sets forth a construction schedule that provides for shift changes which occur outside of peak commuter traffic hours; thus, construction traffic impacts may be somewhat less than those modeled. The arrival and departure of construction workers may overlap with some school bus traffic on area roads; any steps which minimize the impacts of construction traffic generally should also minimize any impacts on school bus schedules. The Siting Board encourages the Company to continue discussions with state and local officials and police to determine which additional measures are required to minimize traffic impacts from construction of the proposed facility.

The record further demonstrates that, where installation of water and sewer lines is required along Route 110, the Company would restripe the roadway and arrange for a police detail to allow continued passage of two-way traffic at reduced speeds throughout the construction period. The record also shows that the Company would limit the time required to install water lines along Route 110 and to install sewer lines along and across Route 110. These measures should ensure the maintenance of two-way traffic along Route 110 throughout the construction period, and the passage of safety and emergency vehicles at all times.

Based on the record, the Siting Board concludes that, with the implementation of mitigation measures developed in consultation with Dracut, the traffic impacts of the construction of the proposed facility would be minimized. Accordingly, the Siting Board finds that the traffic impacts of the proposed facility would be minimized.

J. Electric and Magnetic Fields

This section describes the EMF impacts of the proposed facility and potential mitigation.

1. Description

Nickel Hill indicated that the operation of the proposed facility would produce magnetic fields associated with increased power flow on certain existing transmission lines (Exh. NHE-2, at Appendix F, at 1-1).[118] The Company stated that the proposed facility would interconnect with the existing 345 kV #394 line at the NEP transmission corridor to the west of the project site (id.; Exh. NHE-1, at 4.11-1; Tr. 12, at 1593).

The Company stated that the NEP transmission ROW varies in width from 350 to 500 feet (Exhs. NHE-1, at 4.11-1; NHE-2, at Appendix F, at 1-1; Tr. 12, at 1599). The Company indicated that the ROW is occupied by five lines, the #394 line being the second from the east

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[118] The Company also discussed electric and magnetic fields at the residences nearest to the proposed transmission line interconnection and the plant switchyard (Exh. EFSB-E-3). The Company stated that due to the large distances (1,600 to 2,300 feet) to the nearest residences, EMF impacts from the interconnection line would be minimal and levels would be indistinguishable from those that existed prior to construction of the interconnection (id.).

side of the ROW (Exhs. NHE-1, at 4.11-6; NHE-2, at Appendix F, at 4-1; Tr. 12, at 1598). The Company initially stated that there would be no need to reconductor or add new lines along the NEP transmission ROW to accommodate the project; however, the Draft System Impact Study prepared by NEP for the project suggests that reconductoring of some existing 115 kV line segments on other ROWs connecting to the Ward Hill substation may be required to avoid thermal overloads (Exhs. NHE-1, at 4.11-1; EFSB-E-1, Att. at 2).

The Company stated that electric fields caused by the #394 line would not change as a result of the interconnection of the proposed facility, because there is no anticipated change in transmission line voltage (Exhs. NHE-1, at 4.11-1; NHE-2, at Appendix F at 1-2). The Company stated that the maximum measured electric field at the edge of the ROW was 0.7 kilovolts per meter ("kV/m"), and that this is below the 1.8 kV/m value previously accepted by the Siting Board (id.).

The Company stated that it conducted a survey of magnetic field strengths in March 1999 along four roads that traverse the NEP transmission corridor in Dracut and Andover (Exhs. NHE-1, at 4.11-6; NHE-2, Appendix F at 4-1). The Company indicated that magnetic field strengths along the center of the ROW varied from 38.6 to 48.0 milligauss ("mG") at the four road crossings, with a maximum edge of ROW magnetic field strength of 17.6 mG (Exhs. NHE-1, at 4.11-15; EFSB-E-5). The Company calculated that the maximum magnetic field levels at the edge of the ROW would be 29.8 mG or less with the proposed facility on-line, and stated that a magnetic field strength of 85 mG at the edge of a ROW had previously been accepted by the Siting Board (Exhs. EFSB-E-5; NHE-2, Appendix F at 1-1 to 1-2; Tr. 12, at 1594).

The Company stated that the closest residences to the NEP transmission corridor in the survey area were 70 feet west and 120 feet east of the ROW edge (Exh. EFSB-E-3). Magnetic field levels at these residential locations were measured at 1.9 and 9.6 mG, respectively (id.). The Company stated that the maximum expected magnetic field levels at these residences would be 8.2 and 13.9 mG, respectively, with the proposed facility on-line (id.).

2. Analysis

The record indicates that the proposed project would be interconnected to NEP's 345 kV

#394 line at the western edge of the Brox properties. The Company's EMF analysis shows that electric fields at the edge of the NEP transmission ROW would not change and that magnetic fields at the edge of the ROW would be a maximum of 29.8 mG, a level approximately 12.2 mG greater than the highest edge-of-ROW level measured by the Company in March 1999.

In a previous review of proposed transmission line facilities, the Siting Board accepted edge-of-ROW levels of 1.8 kV/m for the electric field and 85 mG for the magnetic field. Massachusetts Electric Company, et al., 13 DOMSC 119, at 228-242 (1985) ("1985 MECo/ NEPCo Decision"). Here, off-site magnetic fields at the edge of the NEP transmission ROW would remain well below the levels found acceptable in the 1985 MECo/NEPCo Decision. The record further indicates that, given that electric and magnetic field levels decrease as the distance from a source increases, the proposed project would result in smaller magnetic field changes at nearest residences and other locations set back from the ROW, than at the ROW edge.

Although the #394 line does not require reconductoring or other upgrades, the Draft System Impact Study suggests that reconductoring of some existing 115 kV line segments may be necessary to avoid thermal overloads. The Siting Board notes that, to the extent reconductoring or other transmission line upgrades may be required, there may be opportunities to reduce magnetic fields through changes in transmission line design.

The Siting Board wishes to remain informed as to the progress and outcome of transmission upgrade designs related to interconnecting the proposed project. Therefore, the Siting Board directs Nickel Hill to provide the Siting Board with an update on the extent and design of required transmission upgrades, if any, and the measures incorporated into any transmission upgrade designs to minimize magnetic field impacts, at such time as Nickel Hill reaches final agreement with all transmission providers regarding transmission upgrades.

Accordingly, the Siting Board finds that with the Company's pursuit of cost-effective designs for decreasing magnetic fields along any affected transmission lines that require upgrades, the electric and magnetic field impacts of the proposed facility would be minimized.

K. Land Use

This section describes the land use impacts of the proposed facility, including the impacts

to wildlife species and habitat, and significant cultural resources.

1. Description

Nickel Hill proposes to construct the proposed facility on a 25-acre site located in the southeast corner of Dracut (Exh. NHE-1, at 4.7-1). The 25-acre site was subdivided from 450 contiguous acres of Brox properties extending from Dracut into Methuen (id.; Exhs. INT-MVRE-G-7(d), Bulk Att. at 2-1; EFSB-LU-6-S, Att.; RR-EFSB-49(a)).[119] Nickel Hill stated that the 25-acre site is bounded by Methuen Street to the south; the Methuen/Dracut town line to the east; and Brox Industries crushing and asphalt batch plant operations to the north and west (Exhs. EFSB-G-5, Att; RR-TD-3). Nickel Hill asserts that its choice of site serves to minimize the land use impacts of the proposed facility because it is appropriately zoned, abuts an existing industrial use, is contiguous to gas pipelines and electric transmission lines, and is contiguous to a major electric load center (Tr. 4, at 508-09).

Nickel Hill described the 450-acre Brox properties as "roughly bounded by State Route 110 (Merrimack Avenue in Dracut) to the south; the NEP transmission corridor to the west; Wheeler Street to the east; and agricultural and forested land, a portion of the Tennessee pipeline, and the Asadorian Heights subdivision to the north" (Exhs. NHE-2, at 3-1; INT-MVRE-G-7(a), Att. at 3-1). The Company indicated that Brox Industries operates a rock quarry, stone crushing plant, and asphalt batch plant within its 450-acre holdings (Exh. INT-MVRE-G-7(d), Bulk Att. at 2-1). The Company stated that Brox Industries intends to continue its current quarrying operations during the construction and operation of the proposed facility (Exh. RR-EFSB-9).

Nickel Hill stated that the area upon which the proposed facility would be constructed is relatively level and largely devoid of trees, as most of the 25-acre site has been disturbed in connection with the operations of Brox Industries (Exh. EFSB-LU-6-S, Att.). The Company indicated that public access to the 25-acre site would be limited by the construction of a fence generally along the eastern border of the Brox properties in Methuen, along Wheeler Street, and

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[119] Nickel Hill and Brox Industries have executed a term sheet that addresses the terms to be included in an anticipated lease agreement and option to purchase (Exh. RR-MVRE-7; Tr. 1, at 15, 39-42; Tr. 7, at 912).

extending at least 100 yards westward, along the northern edge of the Brox properties (Exhs. RR-TD-15, Att.; EFSB-G-13(d), Att. at 10). The Company stated that a tractor-trailer parking lot, storage area, and pond are located on the southern portion of the 25-acre site (Exhs. NHE-1, at 4.7-1; NHE-2, at 5.1-1).

Nickel Hill stated the 25-acre site is zoned light industrial ("I-L"), a designation which permits a proposed private or public utility facility to be constructed by special permit issued by the Dracut Board of Selectmen and upon site plan review (Exhs. EFSB-LU-1(a); EFSB-LU-3; INT-MVRE-G-7(d), Bulk Att. at 2-2; NHE-1, at fig. 4.7-2; Tr. 4, at 485-86).[120] On December 7, 1999, Nickel Hill received its Special Permit, which incorporates over 100 conditions addressing site conditions, visual, water, wetlands, air, and noise impacts, hazardous material and safety issues, and facility construction, and transportation (Exh. INT-MVRE-G-7(d), Bulk Att. at 2-2).[121] The Company indicated that the proposed facility would require a zoning variance because the height of both the building and stacks would exceed the 65-foot maximum height set forth in section 2.12.50 of the Dracut Zoning By-laws (Exhs. NHE-1, at 4.7-1; EFSB-LU-3). The Company stated that it has not yet applied for the height variance (Tr. 4, at 483).

Nickel Hill stated that most of the remaining Brox properties in Dracut are zoned I-L, although minor portions are zoned residential and business/commercial (Exhs. EFSB-LU-1(a); EFSB-LU-3; INT-MVRE-G-7(d), Bulk Att. at 2-2; NHE-1, at fig. 4.7-2; Tr. 4, at 486). The Company asserted that residential development of the I-L zoned portions of the Brox properties would require an amendment to the Dracut Zoning By-laws (Exh. RR-EFSB-63; Tr. 4, at 488). Nickel Hill stated that portions of the Brox properties located in Methuen are similarly zoned limited industrial and that the Brox properties located within one-half mile east of the eastern

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[120] Amendment 2.11.43 of the Dracut Zoning By-laws was adopted in June of 1999 which defines "public or private utility facilities" as: "[f]acilities, equipment and structures necessary for generating electricity for commercial purposes, or for conducting a service by a public service corporation" (Exh. RR-TD-2, Att.; Tr. 4, at 483-484).

[121] The record indicates that the Special Permit applies to all of the 450 acres owned by Brox Industries within Dracut (Assessor's Map 39, Lots 1A, 16-14, 16-15, 16-16, 16-17, 16-18, 2, 3, 7.26; Assessor's Map 55, Lot 1A, 16-9, 16-10, 16-11, 16-12, 16-13, and 35) (Exh. INT-MVRE-G-7(a), Att. at Appendix B; Tr. 13, at 1710).

boundary of the 25-acre site, i.e., Wheeler Street, are predominately zoned limited industrial, with the exception of an area zoned agricultural/conservation which borders the Brox properties (Exhs. NHE-1, at 4.7-1; RR-MVRE-26; Tr. 15, at 1889-1890).

The Company indicated that the land uses within one-half mile of the 25-acre site consist primarily of forest (58.0 percent) and mining (28.7 percent), with the remaining land divided among residential, cropland, water, urban open, and wetland uses (Exh. RR-TD-4; Tr. 4, at 501). The Company also stated that land uses within a one mile radius of the 25-acre site consist primarily of forest (46.2 percent), residential (17.1 percent), and mining (10.1 percent), with the remaining land divided among cropland, water, pasture, urban open, wetland, woody perennial, and recreational uses (id.). The Company noted that a 30-acre sand and gravel operation, Zambino Sand and Gravel, is located to the east of the site, across Wheeler Street in Methuen, and that another sand and gravel operation, New England Cement Block and Pipe Company, is located to the southwest of the Brox properties (Exh. INT-MVRE-G-7(d), Bulk Att. at 3-2).

The Company stated that 86 residences are located within a one-half mile radius of the 25-acre site in Dracut and Methuen; these residences are located to the north on Rinzee Road, Poppy Lane, and Wheeler Street, and to the southeast along Lowell Street (Exhs. EFSB-LU-4; NHE-1, at 4.7-4; RR-TD-4; Tr. 4, at 429, 501). The Company stated the closest residence to the 25-acre site is located on Poppy Lane, approximately 1,600 feet from the edge of the proposed power block (Tr. 4, at 429).

Nickel Hill stated that neighboring land uses would be separated from the proposed facility by the surrounding Brox properties, including wooded areas to the north, east, and south of the site (Exh. INT-MVRE-G-7(d), Bulk Att. at 3-2). As discussed in Section III.F, the Company indicated that Brox Industries is committed to maintaining 18 acres due east of the 25-acre site in its current wooded/wetland state for the life of the proposed facility (id.). The Special Permit requires the preservation of the 18 acres in substantially its current state until the removal of the facility (Exh. EFSB-G-13(d), Att. at 14). These 18 acres consist of wooded land, scrub vegetation, revegetated area, and land designated as a wetland buffer area (Tr. 4, at 476). In addition, areas to the north and west of the 25-acre site are subject to a 1990 agreement between Brox Industries and Dracut, which provides that Brox will not conduct quarrying

operations and will grade and stabilize areas for which quarrying activities are completed along the northern and western boundaries of the 450-acre Brox properties (Exhs. INT-MVRE-G-7(d), Bulk Att. at 3-2; RR-MVRE-25). This area is north and east of the NEP transmission ROW (Exh. RR-MVRE-25(b), Att.). Moreover, the Special Permit requires the Board of Selectmen to approve a plan for the preservation of the visual buffering provided by wooded areas to the north of the 25-acre site for the life of the proposed facility (Exh. EFSB-G-13(d), Att. at 13). The Special Permit also provides that if the facility is generally out of service for two years, Nickel Hill or the owner of the 25-acre site shall remove the facility and return the area to a graded and vegetated condition (id. at 10).[122]

Nickel Hill indicated that it has agreed to construct a 30-foot wide access road to the 25-acre site from Methuen Street (which crosses Brox property) using Dracut "public road" specifications (Exhs. EFSB-G-5, Att.; RR-MVRE-7). The Special Permit provides that the existing tree line may be cleared only to the degree necessary to construct the 25-acre site access road and stormwater drainage components of the proposed facility, or to provide adequate sight distances for vehicles exiting the 25-acre site access road onto Methuen Street (Exh. EFSB-G-13(d), Att. at 25). Nickel Hill also indicated that Brox Industries intends to relocate the existing Brox access road, which connects Route 110 to Methuen Street (Exhs. RR-MVRE-8; RR-TD-10, Att.; Tr. 4, at 421-422).[123] Nickel Hill stated it would be granted an easement to use the relocated Brox access road, which Brox Industries would maintain (Exh. RR-MVRE-8).

Nickel Hill also discussed the land use impacts of the gas, electric, and water interconnections for the proposed facility. The Company stated that the proposed facility would interconnect with the Tennessee and the M&NE pipelines at a point where an existing Tennessee ROW abuts the northwest corner of the Brox properties (Exhs. EFSB-G-5, Att.; INT-MVRE-G-

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[122] The Special Permit further provides that Nickel Hill shall annually deposit, for 29 years, funds in an account for Dracut for removal of the facility and restoration of the area should Nickel Hill or the site owner fail to do so as conditioned in the Special Permit (Exh. EFSB-G-13(d), Att. at 10).

[123] The Company anticipates that Brox Industries will remove the unused portion of the existing Brox access road (approximately 0.8 acres) and return it to vegetation (Exh. RR-EFSB-25).

7(d), Bulk Att. at 3-8**)**. An approximately 3,700-foot interconnecting gas pipeline, to be constructed entirely on Brox property, would run westerly from the power block, skirting the active quarrying area, along the northern boundary of the Brox properties (id.). In addition, the Company indicated that M&NE would construct a lateral of less than one-half mile along the existing Tennessee ROW to serve the proposed facility (id.).

The Company stated that the proposed facility would interconnect with an existing NEP 345 kV transmission line, which crosses the western portion of the Brox properties (Exh. EFSB-G-4). An approximately 4,200-foot 345 kV overhead circuit would run westerly from the 345 kV switchyard adjacent to the turbine building, spanning the active quarrying area, and crossing cleared and uncleared Brox property, to the NEP transmission ROW (Exhs. EFSB-G-4; INT-MVRE-G-7(d), Bulk Att. at 3-8 to 3-9). Nickel Hill stated that the nearest residences are within 1,200 feet of the 345kV switchyard, 1,400 feet of the point of interconnection with NEP's transmission line, and 2,100 feet of the interconnection with the Tennessee and M&NE pipelines (Exhs. EFSB-LU-5; RR-TD-3, Att.). The Company stated that construction of the river water intake structure would require the submission to MADEP of a G. L. c. 91 license application and compliance with the waterways regulations at 310 CMR, § 9.00 (Exh. RR-EFSB-11).[124]

The Company did not identify any substantial effects of the facility on wildlife or wildlife habitat. Nickel Hill provided an opinion from the Massachusetts Division of Fisheries and Wildlife - Natural Heritage and Endangered Species Program stating that, although the proposed facility would be built within the natural habitat of the bald eagle along the Merrimack River, the proposed facility will not adversely affect the actual habitat of the bald eagle (Exhs. EFSB-LU-9-S2; EFSB-LU-9(c)). The Company stated that "according to the most recent edition of the Massachusetts Natural Heritage Atlas, no Estimated Habitats of Rare Wetlands Wildlife and Certified Vernal Pools or High Priority Sites of Rare Species Habitats and Exemplary Natural Communities occur" on the Brox properties as a whole or on the 25-acre site (Exh. NHE-1,

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[124] The Company indicated that if the pumphouse remains at the intersection of the existing Brox access road and Route 110, the water line would follow the existing road. If the pumphouse is located at the Route 110 turnaround, the water lines would most likely follow the relocated Brox access road (Exh. RR-EFSB-25).

at 4.4-3).

An Intensive (Locational) Archaeological Survey, conducted by a Nickel Hill contractor, concluded that the 25-acre site was not "archaeologically significant" (Exh. EFSB-LU-10(a)). Further, the Massachusetts Historical Commission, commenting on the DEIR, stated that the survey found that because no significant historic or cultural resources were identified, no further review by the Massachusetts Historical Commission is warranted (Exh. EFSB-LU-10(b)).

Nickel Hill stated that construction of the proposed facility and ancillary facilities (e.g., main facility site and access road, gas line with access road, transmission line and NEP interface, sewer and water lines, and river water intake and pump station area) would result in the permanent loss of 9.5 acres of vegetation and an additional 3.1 acres of temporary vegetation disturbance (Exh. RR-EFSB-8). Construction of the proposed facility would involve some clearing of and placement of structures upon 6.4 acres of the 25-acre site (Exhs. EFSB-MVRE-G-7(a), at 6-11; NHE-2, at 6-8).

2. Analysis

As part of its review of land use impacts, the Siting Board considers the extent to which a proposed facility would be consistent with existing land uses, and with state and local requirements, policies, or plans relating to land use, and considers impacts on terrestrial resources, including vegetative cover and habitat. Here, the record indicates that the proposed facility would be located on previously disturbed industrially zoned property subdivided from an active quarrying and asphalt manufacturing operation. The proposed facility is allowed under the Dracut Zoning By-laws through the Board of Selectmen's approval of a Special Permit and site plan review, which approval has been granted. Because of the height of the power block and stacks, a variance from the Dracut Zoning Board of Appeals would be required. Thus, the Siting Board finds that construction of the proposed facility is consistent with the present industrial use of the site.

The record indicates that the area within a one-half mile radius of the 25-acre site is predominately forest and mining, with 58 percent of the land area given to forest use and 28.7 percent to mining. Thus, the vast majority of the surrounding land uses within a one-half

mile radius of the 25-acre site are non-sensitive. The record indicates that minimal residential zoning exists within a one-half mile radius of the 25-acre site and that the closest residence to the 25-acre site is 1,600 feet from the proposed power block. The record also indicates that the 25-acre site is buffered by existing terrain and forest and that the existing buffer, to a large degree, will be preserved through the provisions and conditions of the Special Permit. Moreover, as described in Section III.F, above, the Siting Board has required Nickel Hill to comply with certain conditions which would minimize visual impacts from neighboring residential areas. Therefore, the Siting Board finds the proposed facility would have minimal impacts on sensitive neighboring land uses.

Nickel Hill has adequately considered the likely impacts of the proposed facility with respect to wildlife species and habitats, and historic and archaeological resources. Based on its review of information submitted by the Company, the Siting Board finds that no resource impacts are likely to occur as a result of the construction or operation of the proposed facility.

Given the presence of mining, industrial, and utility land uses in the immediate project area, the extent of site buffering, and the conditions which would limit the visual impacts of the proposed facility, the Siting Board concludes that the proposed facility will be compatible with existing land uses. Accordingly, the Siting Board finds that the land use impacts of the proposed facility would be minimized.

L. Cumulative Health Impacts

This section describes the cumulative health impacts of the proposed facility. The Siting Board considers the term "cumulative health" to encompass the range of effects that a proposed facility could have on human health through emission of pollutants over various pathways, as well as possible effects on human health unrelated to emissions of substances (e.g., health effects of noise and of EMF). Cumulative health effects are considered in the context of existing background conditions, existing baseline health conditions, and, when appropriate, likely changes in the contributions of other major emissions sources.

The analysis of the health effects of a proposed generating facility is closely related to the analysis, in sections above, of specific environmental impacts which could have an effect on

human health and any necessary mitigation measures. This section sets forth information on the human health effects that may be associated with air emissions, including criteria pollutants and air toxics, discharges to ground and surface waters, the handling and disposal of hazardous materials, EMF, and noise. In addition, this section describes any existing health-based regulatory programs governing these impacts and considers the impacts of the proposed facility in light of such programs.

1. Baseline Health Conditions

The baseline health conditions prevailing in the Merrimack Valley were a subject of considerable debate in this proceeding. Certain intervenors expressed concern that the Merrimack Valley population already suffers from increased health risks relative to any randomly selected group of the same size, citing exposures to other power plants and to mercury, along with high rates of asthma and other diseases (Bruton/Vrountas Brief at 14). In comments on the FEIR, Sharon Pollard, Mayor of Methuen, contended that higher levels of asthma and certain types of cancer in the Merrimack Valley are due to air pollutants from incinerators, commercial and industrial facilities, and cars on highways (Exh. INT-MVRE-G-7(d), Bulk Att. at Section 9, Commenter 8). A limited number of people expressed the belief that the region had higher cancer rates than the rest of the state (e.g., Exh. NHE-2, at Appendix G, Commenter 49). More specifically, several sets of comments on the Environmental Notification Form refer to the elevated breast cancer incidence in Andover as a baseline health condition, mostly of concern relative to air emissions from the proposed facility (id. at Appendix G, Commenters 37, 41, 52, 54, 56, 57).

In response, Nickel Hill argued that none of the 24 Merrimack Valley communities studied had overall cancer incidence rates that were significantly higher than statistically expected and that, of the individual forms of cancer that had statistically significant excesses in one or more of the Merrimack Valley communities, none could be associated with operation of a gas-fired power plant (Nickel Hill Brief at 157). Nickel Hill also argued that factors other than outdoor air quality are responsible for high hospital discharge rates for asthma in Lawrence (id. at 156).

Studies entered into the evidentiary record of the case, providing information on regional baseline health conditions, include a 1997 Massachusetts Department of Public Health ("MADPH") study entitled Cancer Incidence in Massachusetts 1987-1994: City/Town Supplement ("MADPH Cancer Incidence Report") (Exh. RR-EFSB-51, Att.); a 1998 report entitled The Health of the Merrimack Valley ("Merrimack Valley Report") authored by Eugene DeClercq, Ph.D. (Exh. EFSB-H-A-4, Att. 2); and a 1998 MADPH study entitled Evaluation of Breast Cancer Incidence in Andover, MA: 1987-1994 ("Andover Breast Cancer Report") (Exh. NH-MVRE-JW-19, Att. 2). Also entered into the evidentiary record is a 1998 critique of a MADEP document, entitled Ignoring Motherhood, Milk, and Mercury ("Incinerator Study Critique"), which was prepared by three authors, including Ms. Watts, witness for MVRE, and endorsed by several environmental groups (Exh. EFSB-H-A-4, Att. 1).

The Cancer Incidence Report compared the incidence rate of cancer in 24 categories for each of the 351 Massachusetts cities and towns with the state-wide average for males, females, and the total population, and noted statistically significant deviations (Exh. NHE-2, at 5.14-5). The Merrimack Valley Report presented and discussed demographics and health status data from 24 cities and towns in the region, including some data from the MADPH Cancer Incidence Report (Exh. EFSB-H-A-4, Att. 2).[125] The Andover Breast Cancer Report provided townwide breast cancer incidence rates and demographic information, and discussed risk factors for breast cancer (Exh. NH-MVRE-JW-19, Att. 2). The Incinerator Study Critique challenged a permit-related draft MADEP document, and focused on the environmental fate of pollutants from two incinerators in the Merrimack Valley (Exh. EFSB-H-A-4, Att. 1).

The MADPH Cancer Incidence Report compared cancer incidence in Dracut to state-wide averages, and found an elevated incidence rate of bladder cancer in males that was

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[125] The cities and towns discussed in the Merrimack Valley Report were: Newburyport, Salisbury, Amesbury, Merrimac, Haverhill, Groveland, West Newbury, Newbury, Rowley, Georgetown, Boxford, Middleton, North Andover, Methuen, Lawrence, Andover, Dracut, Lowell, Tewksbury, Billerica, Chelmsford, Westford, Tyngsborough, and Dunstable (Exh. EFSB-H-A-4, Att. 2).

statistically significant at $p \leq 0.01$;[126] an elevated rate of uterine cancer that was statistically significant at $p \leq 0.05$; and a decreased incidence rate of non-Hodgkin's lymphoma in females (also statistically significant at $p \leq 0.05$) (Exhs. NHE-2, at 5.14-6; RR-EFSB-51, Att.). The Company noted that overall cancer incidence in Dracut was 2 percent above the statewide average, which was not statistically significant (id.). The Company also noted that, as indicated in the MADPH report, a finding of statistical significance does not necessarily indicate biological or public health significance (Exh. NHE-2, at 5.14-7).

The MADPH Cancer Incidence Report compared cancer incidence in Methuen to state-wide averages, and found an elevated incidence rate of colorectal cancer in males (35 percent above expected; statistically significant at $p \leq 0.001$); also, of melanoma, in total, of bladder cancer, in total, and "other cancers," in males and in total (each statistically significant at $p \leq 0.05$) (id. at 5.14-6; Exh. RR-EFSB-51, Att.). The Company noted that overall cancer incidence in Methuen was 5 percent above the statewide average, which was not statistically significant (id.). However, the incidence of total cancers was statistically elevated among males in Methuen (statistically significant at $p \leq 0.05$) (Exh. RR-EFSB-51, Att.).

The MADPH Cancer Incidence Report compared cancer incidence in Andover to state-wide averages, and found elevated incidence rates for breast cancer in females (31 percent above expected; statistically significant at $p \leq 0.001$); elevated rates of colorectal cancer, in males and in total, leukemia, in total, and prostate cancer (each statistically significant at $p \leq 0.05$); and reduced rates of lung cancer, in males and females, and stomach cancer, in total (Exhs. NHE-2, at 5.14-6; RR-EFSB-51, Att.). The Company noted that overall cancer incidence in Andover was 6 percent above the statewide average, which was not statistically significant (id.).

The MADPH Cancer Incidence Report indicated that Lawrence had a statistically

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[126] The p-value is the probability that the observed difference or a greater difference between the observed number of cases and the expected number of cases would be obtained if, actually, the town-wide risk were equal to the state-wide risk. For "$p \leq 0.05$," the probability is at most one in twenty. For "$p \leq 0.01$," the probability is at most one in a hundred. Some findings of statistical significance are expected to occur by chance alone. The smaller the p-value is, the more evidence there is that the observed disparity is not due to chance alone.

elevated incidence of cervical cancer, and statistically reduced incidence of esophageal cancer (in total), melanoma of skin (in both sexes), breast cancer, and non-Hodgkins lymphoma (in total) (Exh. RR-EFSB-51, Att.).

In summarizing cancer data presented in the Merrimack Valley Report, the Company stated that none of 24 Merrimack Valley communities had an overall cancer incidence rate that was significantly higher than statistically expected based on statewide averages (Exh. NHE-2, at 5.14-2).[127] The Merrimack Valley Report also listed cities and towns with statistically significant elevations (but not reductions) at $p \leq 0.01$ among males or females, for the 24 MADPH cancer categories; these consisted of Andover (breast cancer, as noted above), Methuen (colorectal, as noted above), Billerica and Salisbury (bronchus and lung), Tewksbury (kidney and renal pelvis), Boxford (melanoma of skin), Lowell (oral cavity and pharynx), North Andover (prostate), and Dracut (bladder, as noted above) (Exh. EFSB-H-A-4, Att. 2, at 32).

The Company's summary of the Merrimack Valley Report focused on measures of health status related to respiratory health (Exh. NHE-2, at 5.14-6). The Company stated that among the 18 Merrimack Valley communities with 1994 data on hospital discharges for asthma, one-third (6 communities) had discharge rates above state averages and two-thirds had discharge rates below state averages (id.).[128, 129] According to the Company, the hospital discharge rate for asthma for Lawrence was twice the state average, Methuen was also above the state average,

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[127] The Merrimack Valley Report indicated that two communities, Boxford and Haverhill, had overall cancer rates that were significantly lower than would be expected based on statewide averages (Exh. EFSB-H-A-4, Att. 2, at 32).

[128] The Company argued that a high rate of hospital discharge for asthma may be attributable to high population density and housing stock (Nickel Hill Brief at 156). Bruton/Vrountas argued that it is "patently specious" to use hospital discharge data as a measure for asthma prevalence (Bruton/Vrountas Reply Brief at 6).

[129] The Merrimack Valley Report indicated that Lawrence, Haverhill, Merrimac, Methuen, Groveland, and Lowell had hospital discharge rates above the state average; Newburyport, Amesbury, Georgetown, Dracut, North Andover, Billerica, Westford, Chelmsford, Tewksbury, Tyngsborough, Andover, and Dunstable were reported as below the state average; the report did not provide asthma hospital discharge rates for Middleton, Boxford, Newbury, Rowley, Salisbury, or West Newbury (Exh. EFSB-H-A-4, Att. 2, at 32).

Dracut was below the state average, and Andover was one-fourth the state average (Exh. NHE-2, at 5.14-2).[130] As indicated by the Company, hospital discharge rate for pneumonia was broadly similar to asthma: the rate for Lawrence was well above the state average, Methuen was also above the state average, and Dracut and Andover were below the state average for pneumonia (id.; Exh. EFSB-H-A-4, Att. 2, at 30).

The Merrimack Valley Report was also cited in Ms. Watts' prefiled testimony as stating that there is a high prevalence of lead poisoning in Lawrence due in part to old housing stock and "other problems" (Exh. MVRE-DC-4).[131, 132] The Merrimack Valley Report stated that the rate of deaths for heart disease exceeds the state average in 19 of 24 Merrimack Valley communities (Exh. EFSB-H-A-4, Att. 2, at 30).

The Andover Breast Cancer Report stated that there was a 31 percent excess in breast cancer in Andover from 1987 to 1994, relative to average state rates (Exh. NH-MVRE-JW-8, Att. 2, at Table 1). The study determined that the mean age at first full-term pregnancy was higher in Andover than in the state as a whole and increased in Andover between 1975 to 1990 (id. at 17). The study cited an increase in breast cancer screening in the 1980s (id. at 14). The study found data that indicate that Andover as a whole displays higher socioeconomic

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130 The Merrimack Valley Report characterized the rate in Lawrence as *more than double* the state rate (emphasis added); also, the rate in Andover would be more accurately characterized as one-third the state rate rather than as one-fourth (Exh. EFSB-H-A-4, Att. 2, at 29, 30).

131 The Merrimack Valley Report indicates that 1.54 percent of children tested in Lawrence in fiscal years 1996 and 1997 had blood lead levels above 20 micrograms per deciliter ("µg/dL"), a percentage well above the state average (Exh. EFSB-H-A-4, Att. 2, at 21). The rate in Methuen, 0.49 percent, also exceeds the state average of 0.32 percent, while Dracut and Andover were well below the state average (id.).

132 The Merrimack Valley Report characterizes Lawrence (as well as Lowell and Haverhill) as having higher population densities, higher non-white populations, higher poverty rates, higher unemployment, and a lower proportion of single family homes, compared to the smaller communities in the Merrimack Valley (Exh. EFSB-H-A-4, Att. 2, at 5). The study states that, based on demographic features, it is not surprising that these three communities have a disproportionate share of the region's health problems (id. at 8). The report indicates that childhood lead poisoning is most prevalent in the three larger cities, especially Lawrence (id. at 23).

characteristics than the state (id. at 39) The study indicated that known or strongly suspected factors for increased risk or incidence of breast cancer include early detection brought on by mammography utilization, family history, having fewer children and having children later in life, higher socioeconomic status, higher body weight, and exogenous estrogens (id. at 28 to 34).[133] The study indicated that the cases in Andover did not display any pattern that would suggest that ambient environmental factors were contributing causes (id. at 39).

The Incinerator Study Critique was co-authored by Ms. Watts, witness for MVRE. The critique largely responded to a draft MADEP study intended to evaluate the combined impacts of two incinerators on air quality, but the critique did offer several statements related to baseline health status in the Merrimack Valley region (Exh. EFSB-H-A-4, Att. 1). The critique asserted that high mercury levels have been found wherever local fish were tested (id. at 4). The critique asserted that three trash incinerators operating in the Lawrence area have released high levels of mercury, dioxin, lead, and other persistent pollutants (id. at 5). The critique stated that the Northeast Solid Waste Committee ("NESWC") incinerator in North Andover exceeded its CO limits in the past and modeled dioxin concentrations from NESWC have exceeded MADEP AALs, but that levels of dioxin in soil or food have not been measured (id. at 5, 6). The critique cited the existing high lead poisoning rate in Lawrence in relation to the additional lead emitted by the incinerators (id. at 6, 7). The critique asserted that ten percent of Lawrence public school students have asthma and indicated that three young women died of asthma in the year of the critique (id. at 7).[134]

The record demonstrates that some individual communities in the vicinity of the proposed power plant have health profiles that are markedly different from state averages. These

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[133] Studies cited in the Andover Breast Cancer Report reported a 30 percent increase in breast cancer risk among women under 45 years associated with oral contraceptive use and a 71 percent increase in breast cancer risk among women 60 to 64 years associated with estrogen replacement therapy (Exh. NH-MVRE-JW-8, Att. 2, at 31).

[134] The authors of the critique also cited a high hospital discharge rate for pediatric asthma in Lawrence in 1994-95 (Exh. EFSB-H-A-4, Att. 1, at 7). However, the critique did not identify the source of the asthma statistics that were presented or present comparative data for a wider area such as the state.

differences include statistically elevated and reduced levels of various types of cancer; elevated hospital discharge rates for asthma and pneumonia in Lawrence and Methuen, with reduced rates in Dracut and Andover; and a high prevalence of lead poisoning in Lawrence. Socioeconomic or cultural factors may play a role in differences among individual communities. However, evaluation of baseline health data in the record gives no indication of regional consistency in health status, except for heart disease, which appears to be prevalent at comparatively high levels in many Merrimack Valley communities. The record provides no indication of a connection between heart disease in the Merrimack Valley and environmental exposures.

The record does include some limited data that suggest there could be elevated levels of persistent environmental contaminants such as lead and mercury, in soils, sediments, and fish in the Merrimack Valley. However, total exposures have not been quantified, compared to other parts of the state, or linked to actual health status throughout the Merrimack Valley. While there may be localized health impacts that could be attributed to exposure to these contaminants, given the general lack of consistency in health status among Merrimack Valley communities, there is little basis in the record from which to conclude that environmental exposures in the Merrimack Valley are causing regional health to differ from that of the state as a whole in any consistent fashion.

2. Criteria Pollutants

As discussed in Section III.B.1, above, EPA and MADEP regulate the emissions of six criteria pollutants under NAAQS: SO_2, PM_{10}, NO_2, CO, ozone, and lead. Dr. Valberg, witness for the Company, stated that the primary non-cancer effects of criteria pollutants are: (1) changes in respiratory function (e.g., reduced lung capacity); (2) lung irritation, which may be of concern for people with some existing chronic lung diseases; and (3) correlations with day-to-day mortality statistics (Tr. 12, at 1639-1640). In reference to concerns about air pollution and asthma, Dr. Valberg indicated that ambient air pollution was unlikely to be a factor in recent increases in the prevalence of asthma since air quality has been simultaneously improving (Tr. 12, at 1641). Under cross-examination by the Company, Ms. Watts agreed to statements that the NAAQS are set in a manner that is intended to protect public health, with a margin of safety,

and that, from the perspective of EPA, this margin of safety would protect the health of sensitive populations such as asthmatics, children, and the elderly (Tr. 14, at 1780, 1781).

The Company indicated that EPA established SILs as air quality management tools; SILs are ambient concentration criteria low enough to allow a conclusion that emissions below SILs would not significantly affect modeled air quality, without a detailed evaluation of compliance with the NAAQS (Exh. EFSB-H-2; Tr. 12, at 1648). The Company reported that its dispersion modeling indicated that incremental concentrations due to the proposed gas-fired facility would be below SILs (Exh. INT-MVRE-G-7(a), Att. at 5.1-7). On this basis, the Company concluded that air quality in the area would be essentially the same with or without the plant (Exh. EFSB-H-2).

As discussed in Section III.B.2, above, the Company indicated that regional air quality measurements from Lowell, Lawrence, and Lynn were below NAAQS concentrations in 1995, 1996, and 1997 for SO_2, PM_{10}, NO_2, CO, and ozone (Exhs. EFSB-A-2-S, Att. at 5-13; RR-EFSB-42). To assess air impacts of the proposed facility and other existing sources of emissions, the Company conducted cumulative air modeling of the criteria pollutants (Exh. NHE-2, at 5.2-24 to 5.2-28). The maximum cumulative concentrations presented for the locations of maximum impact for NO_2, SO_2, PM_{10}, and CO are below the NAAQS (id.; Exh. INT-MVRE-G-7(a), Att. at 5.1-13). In addition, the modeling shows that the proposed facility would contribute no more than one-half of one percent ($\leq$0.5 percent) of the cumulative pollutant concentration at any of the points of maximum cumulative impact (id.).[135] The Company asserted that, insofar as the predicted sum of the facility impact and the ambient concentration for any particular chemical is below the applicable NAAQS, no health effects would be expected (Nickel Hill Brief at 152). Specifically regarding lead, the Company indicated that less than 0.2 tpy would be emitted (Exh. EFSB-A-2, Att. at 4-21).[136] Regarding ozone, the EPA stated

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135 This percentage is based on Siting Board staff calculation, based on the cited exhibit.

136 Since excessive lead levels have been documented in Lawrence residents, minimization of lead emissions would be important. The lead emissions predicted by the Company, 0.2 tpy, are calculated based on a detection limit from EPA-reviewed testing of emissions

(continued...)

in 1997 that peak ozone concentrations are typically measured at some considerable distance downwind of sources of ozone precursors (Exh. RR-EFSB-54, Att. at 16). As discussed in Section III.B.5, above, VOC and NO_X emissions would be minimized in accordance with LAER emission rates (Exh. INT-MVRE-G-7(d), Bulk Att. at 2-9, 3-11). Also as discussed in Section III.B.5, above, regional NO_X emissions would be significantly reduced by displacement of marginal generators in the region, and the facility's VOC and NO_X emissions would be offset under the New Source Review regulations (Exhs. NHE-1, at 4.2-1; INT-MVRE-G-7(d), Bulk Att. at 3-28).

As discussed in Section III.B.1, EPA has set in place ambient air quality standards, called NAAQS, for six criteria pollutants: SO_2, PM_{10}, NO_2, CO, ozone, and lead. These standards are set based on an extensive review of the medical literature regarding the health effects of each pollutant, and are designed to be protective of human health, including the health of sensitive subgroups, with an adequate margin for safety. Sithe West Medway Decision, 10 DOMSB at 350; Sithe Mystic Decision, 9 DOMSB at 192. The Siting Board gives great weight to these standards as indicators of whether incremental emissions of criteria pollutants will have a discernable impact on public health. Sithe West Medway Decision, 10 DOMSB at 350; Brockton Power Decision, 10 DOMSB at 88; Sithe Mystic Decision, 9 DOMSB at 192.

The record also shows that MADEP has set in place standards for reviewing the compliance of proposed new sources of criteria pollutants, such as the proposed facility, with NAAQS. New sources may not cause or contribute significantly to a violation of NAAQS. Sithe West Medway Decision, 10 DOMSB at 350; Sithe Mystic Decision, 9 DOMSB at 192. In addition, as discussed in Section III.B, above, MADEP requires major new sources to meet BACT (when the area is in attainment or is unclassified for a particular pollutant), or LAER (when the area is in non-compliance for a particular pollutant), and to obtain offsets for 100 percent or more of emissions when the area is in non-compliance for a particular pollutant.

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[136] (...continued)
from a natural gas-fired turbine, in which no lead was actually detected (Exh. EFSB-A-2, Att. at 4-21). Modeled ambient levels would be over an order of magnitude below MADEP TELs and AALs (id. at 6-10).

MADEP's New Source Program balances environmental impacts and costs when an area is in compliance with NAAQS, and requires stronger measures, including emissions offsets, when an area is in non-attainment. Id. The Siting Board finds that this approach is consistent with its own mandate to minimize both the environmental impacts and costs of proposed generating facilities. Sithe West Medway Decision, 10 DOMSB at 351; Brockton Power Decision, 10 DOMSB at 88; Sithe Mystic Decision, 9 DOMSB at 192. The Siting Board therefore gives great weight to compliance with MADEP air quality programs as an indicator of whether the Company has minimized the health impacts of the proposed facility. Sithe West Medway Decision, 10 DOMSB at 351; Brockton Power Decision, 10 DOMSB at 89; Sithe Mystic Decision, 9 DOMSB at 192.

In this case, the Company's air analysis showed that the Dracut area is unclassified or in attainment for SO_2, PM_{10}, NO_2, CO, and lead, but is treated as being in non-attainment for ozone. In addition, the record indicates that regional background levels are less than the ambient standards for criteria pollutants. Thus, Dracut area levels of criteria pollutants are generally within standards set for purposes of protecting public health. Also, the proposed facility's emissions of all criteria pollutants would be below the SILs. Fueling the project with only natural gas tends to minimize air pollution emissions. The Siting Board concludes that there is no evidence suggesting that the proposed facility's emissions of SO_2, PM_{10}, NO_X, CO, and lead would have a discernable impact on public health.

With respect to health impacts of multiple sources in the Merrimack Valley, cumulative air modeling of the proposed facility, together with 28 other sources within a radius of 10 miles of the proposed facility, is described in Section III.B.5, above. The record shows that the cumulative concentrations modeled for each criteria pollutant were below NAAQS.[137] The record also shows that the proposed facility's contribution to modeled pollutant concentrations would be well below one percent of the maximum cumulative impacts for SO_2, PM_{10}, NO_2, and

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[137] As shown in Table 5, above, the Company predicted the maximum cumulative 24-hour average and annual average impacts for SO_2 to be 92 percent and 76 percent of the NAAQS, respectively, and the maximum cumulative 8-hour average impact for CO to be 91 percent of the NAAQS; other cumulative impacts ranged from 39 percent to 57 percent of standards.

CO. The Company has committed to meeting BACT or LAER, as applicable, and to obtaining offsets or allowances for its NO_X and SO_2 emissions as required. Further, displacement analysis performed by the Company indicates substantial reduction in regional emissions of SO_2, NO_X, and CO_2. The record indicates that ground-level ozone concentrations are best evaluated as a regional rather than a local issue, and that increases in regional ozone concentrations associated with the proposed facility would be minimized by compliance with LAER and both direct offsets and displacement of ozone precursor emissions. Based on the stated compliance with MADEP air quality standards, the Siting Board finds that the cumulative health impacts of criteria pollutant emissions from the proposed facility would be minimized.

3. Air Toxics

The Company indicated that, for air toxics, MADEP has developed ambient air quality criteria which are intended to protect public health (Exh. EFSB-H-2). These criteria are presented as 24-hour TELs and annual average AALs (id.). The Company stated that these ambient air quality criteria were developed to ensure that contributions from any single emissions source would not have any significant impact on public health (id.). As discussed in more detail in Section III.B, above, the Company reported that its dispersion modeling indicated that the proposed facility would not produce air toxic concentrations that exceed AALs or TELs (id.). In addition, the Company referred to a 1998 EPA report entitled "Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units – Final Report to Congress" ("HAPs Study"), which assessed emissions from 684 utility plants, including coal-fired, oil-fired, and natural gas-fired generators (Exh. EFSB-H-1). The Company quoted from the HAPs Study, indicating that the cancer risks for all gas-fired plants were well below one chance in one million, and that no noncancer hazards were identified (id.).

The Company stated that one does not generally expect to find mercury in emissions from combustion of natural gas (Tr. 11, at 1530-1531). Specifically, the Company indicated that the proposed facility would emit less than 0.005 tpy of mercury (Exh. EFSB-A-2, Att. at 4-21). Any increases in ambient concentrations were modeled to be 0.1 percent of MADEP TELs and AALs, or less (id., Att. at 6-10).

The record indicates that in the general case, air emissions from gas-fired power plants pose minimal health risks and that in this specific case, the proposed facility would not exceed applicable ambient limits for air toxics. Based on findings attributed to EPA's HAPs Study, the Siting Board concludes that, in the absence of project-specific evidence to the contrary, the emissions of non-criteria pollutants from a gas-fired generating facility should be considered to have no discernable public health impacts. Based on the stated compliance with MADEP AALs and TELs, the Siting Board finds that the cumulative health impacts of non-criteria pollutant emissions from the proposed facility would be minimized.

4. Discharges to Ground and Surface Waters

The Company indicated that during normal facility operations, discharges to land would be limited to stormwater discharges (Exh. EFSB-H-2). The Company stated that the proposed facility is being designed to comply with MADEP stormwater management policy (see Section III.C) and that under normal operating conditions, stormwater runoff should not contain any contaminants that would contribute to adverse health effects (Exh. EFSB-H-2). The Company stated that the stormwater runoff would comply with MADEP stormwater management guidelines and National Pollutant Discharge Elimination System ("NPDES") Construction General Permit Requirements (Exh. EFSB-H-3). The record does not indicate the existence of any high yield aquifer or drinking water supply wells in the immediate area of the proposed project.

The Company indicated that Lawrence and Methuen withdraw water from the Merrimack River for potable water supplies (Exh. NHE-1, at 4.3-21, 4.3-22). Also, there are boating and fishing activities downstream (id. at 4.3-25). The Company indicated that the LRWU is subject to an NPDES permit; that NPDES standards are designed to protect human and ecological health; and that project discharges would not adversely affect the LRWU's ability to meet its permit limits (Exh. EFSB-H-2). As discussed in Section III.C, above, the Company stated that wastewater constituents would principally be concentrated solids from Merrimack River water. The record does not identify any potential for humans to be exposed to any harmful contaminants that might be discharged from the proposed facility to ground and surface waters.

In Section III.C, above, the Siting Board found that the environmental impacts of the proposed facility would be minimized with respect to water resources. Consequently, the Siting Board finds that the health risks of the proposed facility related to discharges to ground and surface waters would be minimized.

5. Handling and Disposal of Hazardous Materials

As discussed in Section III.H above, the proposed project would use 19 percent aqueous ammonia for NO_x control, and limited amounts of lubricating oils and certain other industrial chemicals, primarily for water and wastewater treatment.[138] The Company stated that ammonia is a naturally occurring compound; for instance, ammonia is released in small quantities by human bodies (Exh. EFSB-H-6). The Company stated that use of ammonia in fertilizer constitutes its principal anthropogenic source (id.). The Company identified a concentration of 5 ppm as a threshold of odor detection; concentrations up to 25 ppm as causing no significant irritation; concentrations up to 200 ppm as having a strong odor and likely to cause eye, nose, and throat irritation but which most individuals may be exposed to for an hour without serious health effects or impairment; and 1,000 ppm as a one-hour concentration that would cause severe irritation but would not be life-threatening (id.).

In Section III.H, above, the Siting Board reviewed the Company's plans for storage and handling of hazardous materials, including aqueous ammonia, and its plans for minimizing and responding to accidental releases of hazardous materials. The Siting Board determined that aqueous ammonia and other non-fuel chemicals would be properly managed and stored and that the Company would consider using an AOD system requiring one-third of the on-site ammonia storage of using bulk ammonia for NO_X control. The Company estimated that, in the event of an ammonia tank failure, ammonia concentrations above 200 ppm, the threshold of potential toxicity noted above, would be limited to the 25-acre site and a small portion of the Brox

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138 Sulfuric acid and sodium hydroxide would be used for demineralizer regeneration; sodium hypochlorite would be used as a cooling tower biocide; sodium sulfite may be needed to neutralize residual chlorine in wastewater; and various other chemicals would be used to treat water for the HRSG (Exhs. NHE-2, at 5.12-6; EFSB-W-22).

property abutting the 25-acre site. Nonetheless, to minimize the possibility that Brox employees and other individuals accessing the Brox property would be exposed to harmful concentrations of ammonia, the Siting Board has required the Company either to enclose the ammonia tank or to install other mitigation such as a double-walled ammonia tank, unless it chooses to use an AOD system.

The Company also analyzed an ammonia spill from a tanker truck accident, demonstrating that ammonia concentrations above 200 ppm, the threshold of potential toxicity noted above, would not extend more than 2112 feet from the spill. In order to minimize potential public exposure in case of an accident, the Company has agreed to require that ammonia deliveries be made between 3:00 a.m and 6:00 a.m. In addition, the Siting Board has directed the Company, as part of its development of emergency response plans for the facility, to identify in cooperation with Dracut and Methuen steps to address possible tanker truck delivery accidents along the planned tanker delivery route between the I-93/Route 110 interchange and the proposed site. The Siting Board found that, with the implementation these conditions (and a condition related to fogging and icing), the safety impacts of the proposed facility would be minimized.

As discussed in Section III.E, above, solid and hazardous wastes generated at the facility would include spent water treatment media, spent lubrication oil filters, depleted CO and SCR catalyst units, rags, broken and rusted equipment, and empty containers. The Siting Board found that wastes would either be recycled or removed by licensed waste contractors and disposed of at appropriate disposal sites for hazardous and non-hazardous wastes. The Company has demonstrated that it has in place procedures for the proper handling, storage, and disposal of hazardous materials during construction and operation of the proposed facility. In addition, the Company has demonstrated that ammonia concentrations from an accidental spill would be below levels hazardous to public health at the Brox properties boundaries, and that accidental spills of other hazardous materials could be contained at the source and therefore would not affect public health. Consequently, the Siting Board finds that the health risks from the proposed project related to the handling and disposal of hazardous materials would be minimized.

6. EMF

As discussed in Section III.J, above, the Company predicted that magnetic field strengths would increase along the ROW containing an existing 345 kV (#394) line, to the west of the site, to which the project would interconnect (Tr. 12, at 1596). The Company predicted that electric field strengths along the ROW would not change (Exh. NHE-1, at 4.11-1). The Company stated that magnetic field strength increases would be minimized by interconnecting to the highest voltage line in the area, which minimizes current (Tr. 12, at 1672). The Company estimated that, when the proposed facility is in operation, maximum magnetic field strengths along the edge of the ROW would increase to 29.8 mG (Exh. EFSB-E-5).

The possible health effects of exposure to EMF have been a subject of considerable debate. The Company's witness, Dr. Valberg, stated that it is not known whether there is any mechanism by which EMF can affect biology (Tr. 12, at 1587). The Company indicated that regulatory agencies have not identified an adverse health effect from EMF which could be used to define "safe" exposure levels (Exhs. NHE-1, at 4.11-4; EFSB-H-7). The Company summarized some existing guidance regarding exposure to EMF, noting that there are no regulatory standards for such exposure (Exh. NHE-1, at 4.11-4). The Company stated that the International Radiation Protection Association provides guidance recommending limits on magnetic field exposures for members of the general public, and reported the limit variously as 833 and 1000 mG (id. at 4.11-4, 4.11-5).[139] In a 1985 case involving the construction of the 345 kV overhead HydroQuebec line, the Siting Board heard expert testimony, reviewed the existing literature, and concluded that there was no affirmative evidence that the proposed facilities, which had edge-of-ROW levels of 85 mG, would produce harmful health effects. 1985 MECo/NEPCo Decision, 13 DOMSC at 228-242.

The Company quoted a finding from a 1997 National Academy of Sciences/National Research Council report to the effect that available laboratory and human data have not demonstrated what, if any, magnitudes of power line electric and magnetic fields cause human

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[139] The Company also presented several guidelines for occupational exposure and a guideline of 1000 mG for individuals with pacemakers, issued by the American Conference of Governmental Industrial Hygienists ("ACGIH") (Exh. NHE-1, at 4.11-4).

health effects (Exh. NHE-1, at 4.11-4). The Company provided a copy of this report, which provides a comprehensive review of research up to that date on the biological effects of exposure to power-frequency electric and magnetic fields, including cellular and molecular studies, animal studies, and epidemiological studies (Exh. RR-EFSB-55(a)). The report concludes that the current body of evidence does not show that exposure to such fields presents a human health hazard (id. at 2). With respect to epidemiological studies, the report stated that studies have not identified factors explaining an association between outdoor electrical wiring configurations and childhood leukemia, and indicates also that the aggregate evidence does not support an association between magnetic field exposure and adult cancer, pregnancy outcome, neurobehavioral disorders, and childhood cancers other than leukemia (id. at 3). With respect to in vitro studies, the report finds that exposure to 50-60 Hertz ("Hz") fields induces changes in cultured cells only at field strengths 1,000 to 100,000 times the levels typically found in residences (id. at 6). With respect to animal studies, the study finds no convincing evidence that exposure to power-frequency fields causes cancer or has any adverse effects on reproduction or development in animals (id. at 7). The report finds evidence of behavioral response when animals are exposed to fields that are considerably stronger than fields encountered in a residential environment; however, there was no demonstration of adverse neurological impacts (id.).

The Company also provided journal articles reporting on three recent case-control studies[140] that were conducted to assess the relationship between the risk of childhood leukemia and/or all cancers and residential exposure to magnetic and/or electric fields (Exhs. RR-EFSB-55(a), Att.; RR-EFSB-55(b), Att.; RR-EFSB-55(c), Att.). Two separate articles describing Ontario study findings appear to suggest a relationship between leukemia risk

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[140] The articles provided were: (1) Green, L.M., A.B. Miller, et al., 1999, "A case-control study of childhood leukemia in Southern Ontario, Canada, and exposure to magnetic fields in residences;" (2) Green, L.M., A.B. Miller, et al., 1999, "Childhood leukemia and personal monitoring of residential exposures to electric and magnetic fields in Ontario, Canada;" (3) Linet, M.S., E.E. Hatch, et al., 1997, "Residential exposure to magnetic fields and acute lymphoblastic leukemia in children;" and (4) UK Childhood Cancer Study Investigators, 1999, "Exposure to power-frequency magnetic fields and the risk of childhood cancer."

and measured EMF but not between leukemia risk and proximity to power lines with a high current configuration (Exh. RR-EFSB-55(a), Att.). The 1997 study conducted in several American states found "little evidence" of a relationship between acute lymphoblastic leukemia and either magnetic field levels or electrical wire configurations (Exh. RR-EFSB-55(b), Att.). The British study of a large number of cases and controls found no evidence of a relationship between either childhood leukemia or other childhood cancer and power-frequency magnetic fields (Exh. RR-EFSB-55(c), Att.).

Overall, although there are some epidemiological studies which suggest a correlation between exposure to magnetic fields and childhood leukemia, and some evidence of biological response to exposure to magnetic fields in animal studies, there is no clear evidence of a cause-and-effect association between magnetic field exposure and human health. Thus, the record in this case does not support a conclusion that any changes in EMF levels anticipated as a result of the proposed facility would pose a public health concern. In Section III.I, above, the Siting Board found that the EMF impacts of the proposed facility would be minimized. Accordingly, the Siting Board finds that the health effects, if any, of magnetic fields associated with the proposed facility would be minimized.

7. Noise

As discussed in Section III.G, above, the proposed facility would produce noticeable noise in some surrounding community areas, both during the facility construction period and during operation of the facility. The Company has assessed the noise impacts of the proposed facility in relation to applicable federal and local criteria for acceptable ambient noise, as well as the MADEP standard which limits allowable noise increases from new sources.

The Company provided information indicating that the Occupational Safety and Health Administration ("OSHA") has established guidelines to prevent hearing loss due to long-term exposure to noise; the Company stated that the OSHA limit is 70 dBA, on a 24-hour L_{eq} basis (Exh. EFSB-H-7).[141] The Company stated that there have been studies of sleep disturbance

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[141] The EPA also has identified a sound level of 70 dBA, on a 24-hour L_{eq} basis, as (continued...)

above thresholds in the 40 to 70 dBA range (id.). Dr. Valberg stated that, although noise can disturb sleep, there are no real health guidelines for such disturbances (Tr. 12, at 1582, 1583).

The Company forecasted plant noise as up to 37 dBA, L_{eq}, at residences, with night-time totals for plant noise plus ambient predicted as up to 38 dBA (Exh. NHE-2, at 5.3-25). Construction noises up to 60 dBA, L_{eq}, were forecasted at the nearest residence, and the Company indicated that short duration steam blows could be louder (id. at 5.3-20).

The record shows that operational noise levels in residential areas would be well below thresholds where hearing loss from long-term noise exposure could occur. The record indicates that night-time operational noise levels outdoors at residences would be below the range considered likely to cause sleep disturbance. The record suggests that sleep disturbance would be a possibility if construction were scheduled at night. However, the Company stated that construction hours would be limited to minimize noise disturbances to the community (id. at 6-11). Condition VI.E of the Special Permit requires, with limited exceptions, that construction work would occur only from 7:00 a.m. to 5:30 p.m., Monday through Friday (Exh. INT-MVRE-G-7(a), Att., Appendix B at 24). Also, as noted in Section III.G, above, Dracut noise bylaws limit nighttime noise to 50 dBA at residences. Therefore, no adverse effects on health due to facility noise are expected. As noted in Section III.G, the proposed project has been designed to minimize noise, consistent with minimizing cost of mitigating, controlling, and reducing such impacts. Consequently, the Siting Board finds that the health effects, if any, of noise from the proposed facility would be minimized.

8. Conclusions

In the subsections above, the Siting Board has reviewed baseline health conditions in cities and towns proximate to the proposed facility, and has analyzed the potential health impacts

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141 (...continued)
protecting against damage to hearing; in addition, the EPA identified 55 dBA as a day-night sound level at which normal outdoor conversation at approximately 3 meters would not be impaired (Exh. EFSB-N-5, Att. at 29). The EPA indicated that the complaint level at an L_{dn} of 55 dBA would be approximately one percent, "dependent on attitude and other non-[noise-]level related factors" (id. at 22).

of the proposed facility on the surrounding area over various pathways. With respect to baseline health conditions, the Siting Board has noted that the incidence of some specific types of cancer was statistically elevated, compared to statewide averages, within a recent eight-year period. The Siting Board has also noted that hospitalization rates for pediatric asthma were above statewide averages in Lawrence in 1994-95, and that excessive lead levels have been documented in Lawrence residents.

With respect to potential health impacts, the Siting Board has found that:

(1) the cumulative health impacts of criteria pollutant emissions from the proposed facility would be minimized;

(2) the cumulative health impacts of non-criteria pollutant emissions from the proposed facility would be minimized;

(3) the health risks of the proposed facility related to discharges to ground and surface waters would be minimized;

(4) the health risks of the proposed facility related to the handling and disposal of hazardous materials would be minimized;

(5) the health effects, if any, of magnetic fields associated with the proposed facility would be minimized; and

(6) the health effects, if any, of noise from the proposed facility would be minimized.

The Siting Board recognizes that potential health impacts have been a primary concern for many of the intervenors throughout this proceeding. On brief, for example, MVRE argued that there is no substantial evidence to prove that the cumulative impacts from Nickel Hill and other sources in the Merrimack Valley do not have the potential to contribute to the statistically significant cancer excesses in nine Merrimack Valley communities (MVRE Reply Brief at 18). In addition, certain parties argued that a decision should be delayed until further studies have been completed; for example, Bruton/Vrountas argued that the MADPH study of asthma in the Merrimack Valley should be completed and "other health and cumulative impact studies should be performed" before the Nickel Hill project can be considered (Bruton/Vrountas Brief at 14, n.3).

In response, Nickel Hill argued that there is no credible evidence to support a claim that communities in the Merrimack Valley are any more susceptible to adverse health effects from operation of a generating facility than any other area of the Commonwealth (Nickel Hill Supplemental Brief at 18). Similarly, Dracut argued that the record is void of any evidence drawing credible links between any health ailments and the emissions of a facility such as that proposed (Dracut Reply Brief at 6).

The Siting Board notes that, at this point in the proceeding, the parties differ not so much about the interpretation of the data presented, as about the standard which the Siting Board should adopt in reviewing the potential health impacts of power plants. For example, in their Brief, Bruton/Vrountas quoted with approval the following statement made by MVRE witness Everett Penney:

> "We need to take the attitude that this plant should not be permitted and should not be allowed to operate until we can prove that there's going to be absolutely no adverse public health and environmental impacts." (Bruton/Vrountas Brief at 16).[142]

This is not a standard which the Siting Board can adopt, for several reasons. First, it is inconsistent with the Siting Board's mandate to minimize environmental impacts consistent with minimizing costs (see Section III.A). The Siting Board is required to determine that impacts would be minimized and balanced with costs, not to determine that a facility would have no impacts whatsoever. See G.L. c. 164, § 69J¼. Second, it is an impracticable standard, both because it is generally impossible to prove a negative proposition, and because it is a general rule of environmental science that every action, however minor, will have some impact.
For similar reasons, the Siting Board cannot adopt the position that approval of this facility should be delayed indefinitely pending the completion of further studies regarding background health conditions in the Merrimack Valley. The Siting Board's statute calls for it to issue a decision within a set period of time; the Siting Board therefore need not, and may not, wait for the completion of all conceivably relevant studies before rendering a decision. See G.L. c. 164,

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[142] Because Mr. Penney's statements were not made under oath, they do not constitute evidence in this proceeding.

§ 69J¼. Instead, the Siting Board must use the record data available to it at the time of the proceeding to document the potential health impacts of a proposed generating facility, and must determine in a timely fashion whether these potential health impacts have been minimized. In order to accomplish this, the Siting Board has systematically reviewed the potential impacts of the anticipated emissions from the proposed facility in light of existing information about the health status of the population of Dracut and other communities in the Merrimack Valley. Because this has been an issue of significant concern in this proceeding, we summarize the review here. The Nickel Hill facility is proposed as a combined-cycle, natural gas-fired power plant. It is expected to emit certain criteria pollutants, including SO_2, PM_{10}, NO_2, and CO, as well as VOC, a precursor to the criteria pollutant ozone. It is also expected to emit ammonia, as a byproduct of its NO_X control technology. Because it would be fueled exclusively by natural gas, it is not expected to emit detectable quantities of lead or mercury; these emissions are associated with the combustion of oil or coal, not of natural gas.

As discussed in more detail in Sections III.B and III.L.2, above, the Siting Board has reviewed both the proposed facility's incremental emissions of SO_2, PM_{10}, NO_2, and CO, and the emissions of the proposed facility combined with those of 27 other existing major emissions sources within a 10-mile radius. The proposed facility's incremental emissions all would be below SILs. Further, the cumulative analysis demonstrates that even the combined emissions of the proposed facility and the 27 other major sources would not cause maximum concentrations of criteria pollutants to increase above levels that EPA has determined to be protective of human health. Cumulative concentrations would be approximately 90 percent of these standards for 24-hour SO_2 and for 8-hour CO; however, the proposed facility's emissions would increase concentrations of these pollutants by less than one-half of one percent. Thus, although the proposed facility would emit criteria pollutants, these emissions would not lead to a violation of health-based air quality standards, even in combination with the emissions of other sources in the Merrimack Valley.[143]

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[143] The Siting Board notes that the Secretary of the Executive Office of Environmental Affairs, Robert Durand, in his Certificate on the FEIR for the Nickel Hill project, found (continued...)

The Siting Board also has reviewed the proposed facility's expected emissions of VOC, which along with NO_X is a precursor to ozone. Several intervenors in this case have raised concerns about ozone levels as they relate to the incidence of asthma in certain parts of the Merrimack Valley. The Siting Board notes that ozone is generally formed at a distance downwind of VOC and NO_X sources, and therefore that any effect on ozone levels directly associated with the proposed facility's emissions of VOC and NO_X would primarily be found at locations downwind of the Dracut/Methuen/Andover area. Ozone concentrations in the Dracut/Methuen/Andover area would depend on ozone precursor emissions throughout a wider area, extending well beyond the Merrimack Valley, including emissions sources that are not reflected in the Company's interactive source modeling.

In addition, the record establishes that Nickel Hill would be required to provide VOC and NO_X offsets at ratios of 1.26:1, and includes the Company's analysis indicating that operation of the proposed facility would result in relatively large reductions in NO_X emissions from other generating facilities in the New England region that would be displaced. Given the status of ozone as a regional pollutant, the evidence as to direct offsets and potential additional displacement through economic dispatch has bearing on the evaluation of overall facility impacts. The comparative importance of local emissions, direct offsets, and economic displacement was not established in the record. However, the Siting Board notes that given the very low facility emissions allowed under LAER for VOC and NO_X, the significant (50-fold) modeled displacement of regional NO_X emissions, and the direct offsets of VOC and NO_X emissions, operation of the proposed facility likely would result in decreases in emissions of precursors that affect ozone in the Merrimack Valley; such decreases would offset any contribution of the facility's emission of ozone precursors that affect ozone in the Merrimack Valley. Thus, although it is critical that the proposed facility minimize its VOC and NO_X emissions, those emissions are unlikely to significantly affect public health in the vicinity of the

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[143] (...continued)
that Nickel Hill's air modeling "demonstrates that the facility's modeled emissions will be below levels at which health impacts would be expected" (Exh. INT-MVRE-G-7(d), sec. 9, Certificate at 3).

proposed facility.

As discussed in more detail in Section III.L.3 above, the Siting Board also has reviewed evidence regarding the proposed facility's anticipated emissions of air toxics, non-criteria pollutants frequently associated with an increased risk of cancer. The Company's modeling demonstrates that its emissions of all air toxics, including ammonia, would be below health-based standards set by the MADEP. This modeling is corroborated by the 1998 EPA HAPs Study, which assessed air toxic emissions from generators and concluded that cancer risks for gas-fired plants were well below one-in-a-million, and that no non-cancer risks were identified. The Siting Board recognizes that emissions of lead (which is classified as both a criteria pollutant and an air toxic) or mercury would be of particular concern in the Merrimack Valley region, as excessive lead levels have been documented in Lawrence residents, and there is some indication that elevated levels of persistent environmental contaminants including lead and mercury exist in local soils, sediments, and fish. However, the record indicates that emissions of lead and mercury from the proposed facility, if any, would be at undetectable levels and would be over an order of magnitude below MADEP standards. In short, health impacts from the emission of air toxics have been essentially eliminated through the choice of natural gas as the primary fuel for the proposed facility and the decision to forego the use of oil as a backup fuel.

In summary, then, the record shows that: (1) the criteria pollutant emissions of the proposed facility, in combination with the emissions from other regional facilities, would not cause local air quality to violate health-based standards; (2) because ozone concentrations depend on emissions of precursors over a wide region, emissions of the ozone precursors VOC and NO_X are unlikely to significantly affect public health in the vicinity of the proposed facility; and (3) due to the use of natural gas as the sole fuel for the proposed facility, emissions of air toxics would be extremely low to non-existent, and therefore would not raise health concerns. Ms. Watts, a witness for MVRE, has asserted there likely would be synergistic[144] adverse health effects among pollutants, but did not provide more detailed information as to what such effects might be (Tr. 14, at 1730, 1862). The Siting Board notes that nothing in the record suggests

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144 A "synergistic" effect is any combined effect greater than a simple additive effect.

multiple toxicities with either additive, synergistic, or antagonistic[145] action. Accordingly, the Siting Board finds that the cumulative health impacts of the proposed facility associated with air emissions, considering background health conditions and existing air quality, would be minimized.

In subsections above, the Siting Board also has reviewed potential health-related impacts related to discharges to ground and surface waters, the handling and disposal of hazardous materials, magnetic fields associated with the proposed facility, and noise, and has found that each would be minimized. The record provides no indication that health effects from the different types of potential exposures, however minimal, would combine to create an overall effect greater than the sum of the minimized effects; and the record provides no indication of an interaction of potential facility-related health effects with documented pre-existing health conditions in Dracut and other communities. Consequently, the Siting Board finds that there is no evidence in the record to support a conclusion that the proposed facility would exacerbate any existing public health problems in the Merrimack Valley. Accordingly, based on its review of the record, the Siting Board finds that the cumulative health impacts of the proposed facility would be minimized.

M. Conclusions

Based on the information in Sections II and III, above, the Siting Board finds that Nickel Hill's description of the proposed generating facility and its environmental impacts is substantially accurate and complete.

In Section III.B, the Siting Board has found that, with the implementation of a condition directing Nickel Hill to pay $725,866 in five annual installment during the first five years of facility operation to a cost-effective CO_2 offset program(s) to be selected in consultation with the Staff of the Siting Board, the air quality impacts of the proposed facility would be minimized.

In Section III.C, the Siting Board has found that, with the implementation of a condition directing Nickel Hill to provide to the Lowell Regional Wastewater Utility information on the

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[145] An "antagonistic" effect is any combined effect less than an additive effect.

components of the water treatment products that it uses, with copies to the Siting Board, the water resource impacts of the proposed facility would be minimized consistent with minimizing other environmental impacts and the cost of mitigating, controlling, and reducing such impacts.

In Section III.D, the Siting Board has found that the wetlands impacts of the proposed facility would be minimized.

In Section III.E, the Siting Board has found that the solid waste impacts of the proposed facility would be minimized.

In Section III.F, the Siting Board has found that, with the implementation of conditions directing Nickel Hill: (1) to submit, prior to commencement of construction, a copy of the instrument, in recorded form if required, that provides for the preservation of 18 acres east of the 25-acre site as a woodland buffer; and (2) to provide reasonable off-site mitigation of visual impacts, including shrubs, trees, window awnings, or other mutually agreeable measures, that would screen views of the proposed generating facility and related facilities at affected residential properties and at roadways and other locations within one mile of the proposed facility, as requested by individual property owners or appropriate municipal officials, the visual impacts of the proposed facility would be minimized.

In Section III.G, the Siting Board has found that, with the implementation of the proposed mitigation and the noise easement between Nickel Hill and Brox Industries, the noise impacts of the proposed facility would be minimized, consistent with minimizing cost of mitigation.

In Section III.H, the Siting Board has found that, with the implementation of the conditions directing Nickel Hill: (1) as part of its development of emergency response plans for the facility, to identify in cooperation with Dracut and Methuen steps to address possible tanker truck delivery accidents along the planned tanker delivery route between the I-93/Route 110 interchange and the proposed site; (2) in order to allow the Siting Board to remain informed as to Nickel Hill's choice of an ammonia system, to provide an update to the Siting Board on its evaluation of the performance and relative cost for an AOD system, and its plans for installing a conventional or alternative ammonia system as part of the SCR design based on evaluation of performance and cost; (3) to enclose the ammonia storage tank or incorporate an alternative design such as a double-walled tank to mitigate the impacts of any potential ammonia spill,

unless Nickel Hill determines that it will install an AOD system; (4) to provide an update to the Siting Board, prior to commencement of construction of the ammonia system, on Nickel Hill's plans for installing an ammonia system as part of the SCR design; (5) to monitor fogging and icing in the vicinity of the proposed facility and, as necessary, establish a plan in cooperation with appropriate local officials to deice or sand iced roadways and alert motorists and residents concerning any project-related fogging or icing episodes affecting public safety, the safety impacts of the proposed facility would be minimized.

In Section III.I, the Siting Board has found that the traffic impacts of the proposed facility would be minimized.

In Section III.J., the Siting Board has found that, with the implementation of the condition directing Nickel Hill to provide the Siting Board with an update on the extent and design of required transmission upgrades, if any, and the measures incorporated into any design of required transmission upgrade designs to minimize magnetic field impacts, at such time as Nickel Hill reaches final agreement with all transmission providers regarding transmission upgrades, the EMF impacts of the proposed facility would be minimized.

In Section III.K, the Siting Board has found that the land use impacts of the proposed facility would be minimized.

In Section III.L, the Siting has found that the cumulative health impacts of the proposed facility would be minimized.

Accordingly, the Siting Board finds that, with the implementation of the above-listed conditions, Nickel Hill's plans for the construction of the proposed generating facility would minimize the environmental impacts of the proposed facility consistent with the minimization of costs associated with the mitigation, control, and reduction of the environmental impacts of the proposed generating facility. In addition, the Siting Board finds that an appropriate balance would be achieved among conflicting environmental concerns as well as between environmental impacts and costs.

IV. CONSISTENCY WITH THE POLICIES OF THE COMMONWEALTH

A. Standard of Review

G. L. c. 164, § 69J¼ requires the Siting Board to determine whether the plans for construction of a proposed generating facility are consistent with current health and environmental protection policies of the Commonwealth and with such energy policies of the Commonwealth as are adopted by the Commonwealth for the specific purpose of guiding the decisions of the Siting Board. The health and environmental protection policies applicable to the review of a generating facility vary considerably depending on the unique features of the site and technology proposed; however, they may include existing regulatory programs of the Commonwealth relating to issues such as air quality, water-related discharges, noise, water supply, wetlands or river front protection, rare and endangered species, and historical or agricultural land preservation. Therefore, in this Section, the Siting Board summarizes the health and environmental protection policies of the Commonwealth that are applicable to the proposed project and discusses the extent to which the proposed project complies with these policies.[146]

B. Analysis

In Sections II and III, above, the Siting Board has reviewed the process by which Nickel Hill sited and designed the proposed facility, and the environmental and health impacts of the proposed project as sited and designed. As part of this review, the Siting Board has identified a number of Commonwealth policies applicable to the design, construction, and operation of the proposed facility. These are briefly summarized below.

As discussed in Section III.B, above, the MADEP extensively regulates emissions of criteria and non-criteria pollutants from new sources such as the proposed facility. Nickel Hill has demonstrated that it expects to comply with all MADEP standards.

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[146] The Siting Board notes that its Technology Performance Standard at 980 CMR, § 12.00 could be construed as an energy policy of the Commonwealth adopted for the purpose of guiding the decisions of the Siting Board. The proposed project's compliance with 980 CMR, § 12.00 is discussed in Section III.B, above. The Commonwealth has not adopted any other energy policies pertaining to the Siting Board's review of generating facilities since G.L. c. 164, § 69J¼ was enacted.

As discussed in Section III.C, above, Nickel Hill has demonstrated that it will comply with state and local requirements related to wastewater treatment and stormwater management.

As discussed in Section III.D, above, Nickel Hill has demonstrated that the wetlands impacts of the proposed facility would be minimized. In addition, Nickel Hill has received an Order of Conditions for the proposed project from the Dracut Conservation Commission, as required by the Massachusetts Wetlands Protection Act.

As discussed in Section III.G, above, Nickel Hill has demonstrated that it will limit L_{90} noise increases at the nearest residence to 6 dBA, which is consistent with MADEP Policy 90-001, which limits such increases to 10 dBA. Because operation of the facility would increase noise levels more than 10 dBA above ambient noise levels at the boundary of the 25-acre site, but would not exceed a 10 dBA increase at the boundaries of the 450-acre Brox properties, Nickel Hill and Brox Industries are negotiating a noise easement that would allow both noise level increases of more than 10 dBA and pure tone emissions on Brox Industries properties. The Siting Board anticipates Nickel Hill will seek a waiver of the MADEP property line limit based on the non-residential character of the adjacent off-site areas and the anticipated Nickel Hill/Brox Industries noise easement.

As discussed in Section III.K, above, Nickel Hill has demonstrated that it has complied with state programs protecting historical and archeological resource areas, and rare or endangered species.

Consequently, based on its review above, the Siting Board finds that plans for construction of the proposed facility are consistent with current health and environmental protection policies of the Commonwealth and with such energy policies of the Commonwealth as have been adopted by the Commonwealth for the specific purpose of guiding the decisions of the Siting Board.

V. DECISION

The Siting Board's enabling statute directs the Siting Board to implement the energy policies contained in G. L. c. 164, §§ 69H-69Q to provide a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost. G. L.

c. 164, § 69H. Section 69J¼ requires that, in its consideration of a proposed generating facility, the Siting Board review inter alia the site selection process, the environmental impacts of the proposed facility, and the consistency of the plans for construction and operation of the proposed facility with the environmental policies of the Commonwealth.

In Section II, above, the Siting Board has found that Nickel Hill's description of the site selection process used is accurate and that the site selection process resulted in the selection of a site that contributes to the minimization of the environmental impacts of the proposed facility and the costs of mitigating, controlling, and reducing such impacts.

In Section III, above, the Siting Board has found that with the implementation of listed conditions relative to air quality, water resources, visual, safety, and EMF impacts, Nickel Hill's plans for the construction of the proposed generating facility would minimize the environmental impacts of the proposed facility consistent with the minimization of costs associated with the mitigation, control, and reduction of the environmental impacts of the proposed facility. The Siting Board also has found that Nickel Hill's description of the proposed generating facility and its environmental impacts are substantially accurate and complete.

In Section IV, above, the Siting Board has found that the construction of the proposed facility on balance contributes to a reliable, low-cost, diverse, regional energy supply with minimal environmental impacts.

In Section V, above, the Siting Board has found that the plans for the construction of the proposed facility are consistent with current health and environmental protection policies of the Commonwealth and with such energy policies of the Commonwealth as have been adopted by the Commonwealth for the specific purpose of guiding the decisions of the Siting Board.

Accordingly, the Siting Board finds that, upon compliance with the conditions set forth in Sections III.B, III.C, III.F, III.H, and III.J, above, and listed below, the construction and operation of the proposed facility will provide a reliable energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost.

Accordingly, the Siting Board APPROVES the petition of Nickel Hill Energy, LLC to construct a 750 MW generating facility in Dracut, Massachusetts, subject to the following conditions:

Prior to the commencement of construction of the proposed facility:

(A) In order to minimize air quality impacts, the Siting Board directs Nickel Hill to obtain from the MADEP an air plan approval addressing emissions limits for regulated pollutants, BACT and LAER determinations, the use of SCONO$_X$ or another zero-ammonia technology for NO$_X$ control, VOC and NO$_X$ offset plans, and to file a copy with the Siting Board.

(B) In order to minimize visual impacts, the Siting Board directs Nickel Hill to submit a copy of the instrument, in recorded form if required, providing for preservation of the 18 acres as a woodland buffer.

Prior to the commencement of construction of the ammonia system:

(A) In order to minimize safety impacts, the Siting Board directs Nickel Hill to (1) provide an update to the Siting Board on its evaluation of the performance and relative cost for an AOD system, and (2) on its plans to enclose the ammonia storage tank or use an alternative design as part of the SCR design.

During construction and operation of the proposed facility:

(B) In order to minimize air quality impacts, the Siting Board directs Nickel Hill to provide $725,866 to be paid in five annual installments during the first five years of facility operation, to a cost-effective CO_2 offset program or programs to be selected in consultation with the Staff of the Siting Board. Alternatively, Nickel Hill may elect to provide a single contribution of $590,819 by the end of the first year of facility operation.

(C) In order to minimize water resource impacts, the Siting Board directs Nickel Hill to provide to the Lowell Regional Wastewater Utility information on the components of the water treatment products that it uses, with copies to the Siting Board.

(D) In order to minimize visual impacts, the Siting Board directs the Company to provide reasonable off-site mitigation of visual impacts, including shrubs, trees, window awnings, or other mutually-agreeable measures, that would screen views of the proposed facility at affected residential properties and at roadways and

other locations within one mile of the proposed facility, as requested by residents or appropriate municipal officials. In implementing the off-site mitigation, Nickel Hill: (1) shall provide shrub and tree plantings, window awnings, or other reasonable mitigation on private property, only with the permission of the property owner, and along public ways, only with the permission of appropriate municipal officials; (2) shall provide written notice of this requirement to appropriate municipal officials and to all potentially affected property owners, prior to the commencement of construction; (3) may limit requests for mitigation measures from local property owners and municipal officials to a specified period ending no less than six months after initial operation of the plant; (4) shall complete all agreed-upon mitigation measures within one year after completion of construction, or if based on a request filed after commencement of construction, within one year after such request; and (5) shall be responsible for the reasonable maintenance and replacement of plantings, as necessary, to ensure that healthy plantings become established.

(E) In order to minimize safety impacts, the Siting Board directs Nickel Hill, as part of its development of emergency response plans for the facility, to identify in cooperation with Dracut and Methuen steps to address possible ammonia tanker truck delivery accidents along the planned tanker delivery route between the I-93/Route 110 interchange and proposed site.

(F) In order to minimize safety impacts, the Siting Board directs Nickel Hill to enclose the ammonia storage tank or incorporate an alternative design such as a double-walled tank to mitigate the impacts of any ammonia spill, unless it determines that it will install an AOD system.

(G) In order to minimize safety impacts, the Siting Board directs Nickel Hill to monitor fogging and icing in the vicinity of the proposed facility and, as necessary, establish a plan in cooperation with appropriate local officials to deice or sand iced roadways and alert motorists and residents concerning any project-related fogging or icing episodes affecting public safety.

(H) In order to minimize EMF impacts, the Siting Board directs Nickel Hill to provide the Siting Board with an update on the extent and design of required transmission upgrades, if any, and the measures incorporated into any design of required transmission upgrade designs to minimize magnetic field impacts, at such time as Nickel Hill reaches final agreement with all transmission providers regarding transmission upgrades.

Because issues addressed in this Decision relative to this facility are subject to change over time, construction of the proposed generating facility must be commenced within three years of the date of this decision.

In addition, the Siting Board notes that the findings in this Decision are based upon the record in this case. A project proponent has an absolute obligation to construct and operate its facility in conformance with all aspects of its proposal as presented to the Siting Board. Therefore, the Siting Board requires Nickel Hill to notify the Siting Board of any changes other than minor variations to the proposal, so that the Siting Board may decide whether to inquire further into a particular issue. Nickel Hill is obligated to provide the Siting Board with sufficient information on changes to the proposed project to enable the Siting Board to make these determinations.

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Denise L. Desautels
Hearing Officer

Dated this 13th day of November, 2000.