

RESPONSIVENESS SUMMARY
for
NPDES Discharge Permit No. 3-1199
Entergy Nuclear Vermont Yankee

The above referenced permit was placed on public notice for comment from a period of July 7 through August 27, 2014. A public hearing was held on August 20, 2014 in Vernon, Vermont. This is a renewal permit.

Comments on the draft permit were received during the public notice period. The following is a summary of the comments and the Agency's responses to those comments. Similar comments were grouped together. A copy of any or all comments received can be obtained by contacting the Agency's Watershed Management Division at (802) 828-1535.

Entergy Nuclear Vermont Yankee (ENVY) Comments.

COMMENT 1. ANR (The Agency of Natural Resources) cannot meet the high burden established by both Vermont and federal law for modifications of an issued NPDES (National Pollutant Discharge Elimination System) permit, especially in light of the findings of prior judicial and administrative tribunals.

RESPONSE 1. ENVY states that modifications [during the permit's life] are allowed only in "limited and very specific circumstances"; however, this is not relevant to the NPDES permit ANR is issuing. ANR is not modifying ENVY's permit during the permit's life; rather, ANR is renewing ENVY's NPDES permit after the expiration of the 5 year term of the previous permit issued in 2001 (and last amended in 2006).

The plain language of the applicable Vermont statute specifically provides that NPDES direct discharge renewal permits are subject to the same review criteria as new permits: "A renewal permit shall be issued following all determinations and procedures required for initial permit application" (10 V.S.A. §1263(e)). ANR is thus required to assess and apply state requirements to a renewal permit, including effluent limitations, standards of performance, and any conditions or limitations necessary to meet the Vermont Water Quality Standards (Vermont Water Pollution Control Regulations (VWPCR) 13.4). The regulations state that the reissuance of a discharge permit shall also ensure the following:

- (a) That the permittee is in compliance with or has substantially complied with all the terms, conditions, requirements, and schedules of compliance of the expired permit;

- (b) That the Secretary has up-to-date information on the permittee's production levels, permittee's waste treatment practices, nature, contents and frequency of permittee's discharge either pursuant to the submission of new forms and applications or pursuant to monitoring records and reports submitted to the Secretary by the permittee; and,
- (c) That the discharge is consistent with applicable effluent standards and limitations, water quality standards, and other legally applicable requirements listed in Section 13.4(b) including any additions to, or revisions or modifications of such effluent standards and limitations, water quality standards, or other legally applicable requirements during the term of the permit (VWPCR 13.5(b)).

Additionally, Vermont statutes and regulations relating to the NPDES program are designed to allow for the continual review of the discharge of pollutants to state waters to achieve the goals of the state water quality policy. Title 10 V.S.A. § 1250 and the Vermont Water Quality Standards § 1-102 state that it is the Vermont state water quality policy to:

- (1) protect and enhance the quality, character and usefulness of its surface waters and to assure the public health;
- (2) maintain the purity of drinking water;
- (3) control the discharge of wastes to the waters of the state, prevent degradation of high quality waters and prevent, abate or control all activities harmful to water quality;
- (4) assure the maintenance of water quality necessary to sustain existing aquatic communities;
- (5) provide clear, consistent and enforceable standards for the permitting and management of discharges;
- (6) protect from risk and preserve in their natural state certain high quality waters, including fragile high-altitude waters, and the ecosystems they sustain;
- (7) manage the waters of the state to promote a healthy and prosperous agricultural community, to increase the opportunities for use of the state's forest, park and recreational facilities, and to allow beneficial and environmentally sound development. It is further the policy of the state to seek over the long term to upgrade the quality of waters and to reduce existing risks to water quality.

The review of discharges to state waters every five years is conducted to ensure that advances in scientific knowledge and technology are continually applied to existing discharges to surface waters. *In re Entergy Nuclear Vermont Yankee Discharge, Permit 3-1199*, 187 Vt. 142, 989 A.2d 563, ¶ 27 (2009) (noting the “policy objective to keep permit holders from degrading a body of water over time, and then using the new degraded ecosystem as a baseline to demonstrate that each renewal permit” meets the applicable standards); *In re Dominion Energy Brayton*

Point, LLC, 12 E.A.D. 490, 553 (Envtl. App. Bd. 2006); *In re Montpelier WWTF Discharge Permit*, No. 22-2-08 Vtec, at 9-10 (Vt Env. Div June 30, 2009).

Furthermore, ENVY's comment is also inconsistent with federal law. Vermont policies echo the goal of the Clean Water Act (CWA) to "eliminate' the discharge of pollutants by 1985" and emphasize "the importance of making progress on the available data. 33 U.S.C. § 1251(a)(1)." *Upper Blackstone*, 690 F.3d at 22. The CWA clearly requires NPDES direct discharge permits to be renewed every five years. 33 U.S.C. § 1342(a)(3), (b)(1)(B); 40 C.F.R. § 122.46(a), (b); and 10 V.S.A. §1263(d)(4). The Preamble to the CWA §316 explicitly states that the administrating agency has the authority to require a full §316(a) Demonstration for each five year permit application as deemed necessary by changes in circumstances or where a variance may have been improperly granted. 44 Fed.Reg. 32,854 and 32,894 (June 7, 1979). In addition, the EPA 2010 NPDES Permit Writers' Manual requires that the applicant apply for a variance for each permit term (at page 5-43). Federal regulations require that each permit issuance ensure compliance with the applicable CWA requirements. 40 C.F.R. §§ 122.44, 124.7, and 124.8; *see also, Upper Blackstone Water Pollution Abatement Dist. v. United States EPA*, 690 F.3d 9, 22 (1st Cir. 2012) ("The five-year term limit requires the EPA or state permitting authority to re-ensure compliance with the Act whenever a permit expires and is renewed . . . in regular intervals, the Act requires reevaluation of the relevant factors, and allows for the tightening of discharge conditions."). "[P]ermit expiration and reissuance is an important mechanism for providing regular scrutiny of permit compliance and updating of permit conditions. When permits must be reissued periodically, there is greater assurance that the existing conditions of the permit will be scrutinized to determine whether any of them must be modified or updated." EPA, Consolidated Permit Procedures, 45 Fed. Reg. 33,280, 33,308 (May 19, 1980) (cited by Karl S. Coplan, Of Zombie Permits and Greenwash Renewal Strategies: Ten Years of New York's So-Called Environmental Benefit Permitting Strategy, 22 PACE ENVTL. L. REV. 1, 7 n.42 (2005)).

ENVY incorrectly asserts that ANR has the burden to prove that altering the thermal limits from the previous NPDES permits issued to ENVY are necessary to meet Vermont Water Quality Standards. Federal statute clearly places the burden of proof on the applicant, not on the permitting authority (33 U.S.C. § 1326(a)): in order to qualify for a variance, a permit applicant must demonstrate, among other things, that a proposed effluent limitation will be more stringent than necessary to assure the protection and propagation of a balanced and indigenous fish population (BIP) and that an alternative, less stringent limitation will nevertheless assure such protection and propagation.

Vermont law is also clear that the burden is on the permit applicant to prove that all applicable laws and regulations are met. *In re Entergy Nuclear Vermont Yankee Thermal Discharge Permit Amendment*, 187 Vt. 142, 989 A.2d. 563, (Vt. 2009) at 11-12. The Vermont Supreme Court held in *Entergy*:

The burden of making the necessary showing under § 316(a) is necessarily on the applicant. See *Brayton Point*, 12 E.A.D. at 552 (noting that § 1326(a) and the regulations “clearly impose the burden of proving that the ... thermal effluent limitations are too stringent on the discharger seeking the variance, not on the Agency”). Though federal decisions applying § 316(a) have determined that the burden is “stringent,” the “EPA has not ... interpreted [the statute] to require absolute certainty before a variance [can] be granted” (*Mirant Kendall*, at 34).

Id. at 12. Accordingly, it is clear that Entergy has the burden of proof in this matter.

ENVY also mischaracterizes the legal effect of prior decisions of the Environmental Division of the Vermont Superior Court (Environmental Court) and the Vermont Public Service Board (PSB). The litigation before the Environmental Court and the Vermont Supreme Court referenced by ENVY involved the review of an *amendment* to a NPDES thermal discharge permit issued under the CWA, and the scope of review by the Court was confined to the *amendment* request. As noted above, this permit being issued by ANR is a renewal of ENVY’s NPDES permit following the expiration of the previous permit, not an amendment during the life of the permit.

As the Environmental Court observed:

The Court only has before it the issue of the additional thermal discharge proposed by the amendment application. As discussed in the pretrial proceedings and at trial, it is beyond the scope of the present proceeding for the Court to consider any amendment of the summer thermal discharge already allowed to be discharged by the unappealed existing expired permit, or whether any other aspects of the Vermont Yankee thermal regime are working well or should be changed — such issues will be for the ANR to consider in the first instance in its work on the pending renewal permit application. (*In re Entergy Nuclear Vermont Yankee Thermal Discharge Permit Amendment*, Vtec 89-4-06, page 6 (Vt Env Div. May 22, 2008)).

Given the narrow scope of the Environmental Court’s review of ENVY’s proposed NPDES amendment, none of the parties had the opportunity to litigate the entire range of impacts related to thermal discharge in the proceedings before the Environmental Court. The Environmental Court inquiry focused only on the request for a 1° F increase during the period of May 16 to October 14. The Court affirmed ANR’s denial of the request from May 16 to June 15. The entire focus of the litigation before the Court was on whether the thermal discharge was sufficiently protective of the BIP of fish and wildlife under the CWA § 316(a). ANR and the Court did not reexamine the thermal formula as it was applicable to the entire thermal regime all year long and beyond the scope of the amendment. In addition, the previous litigation did not focus on whether the cooling water intake structure meets the best available technology under CWA § 316(b). Accordingly, the prior decision from the Environmental Court only addressed the one degree amendment request and did not adjudicate the issues addressed by ANR in the renewal permit.

With regard to the recent decision of the PSB referenced by ENVY, ENVY submits that the PSB found no evidence of actual harm to the Connecticut River from the thermal discharge and the thermal discharge has not impaired the

river. ENVY points to these findings as evidence that ANR should not alter the existing thermal discharge limits in its previous thermal discharge permit. ENVY mischaracterizes the findings and conclusions of the PSB related to the thermal discharge by failing to presenting the full context of the PSB decision.

In the PSB Order cited by ENVY, the PSB held:

The evidence in this proceeding raises questions about the effect of the discharge from the VY Station on the Connecticut River. On the one hand, Entergy VY has complied with the limits in its NPDES permit. That permit was developed based upon the applicable legal requirements, including a variance under Section 316 of the federal Clean Water Act, which requires certain showings about the effect of the discharge on indigenous species.

Countering this information are various analyses suggesting that the increase in river temperature resulting from the discharge is such that various fish species are affected. These witnesses report smaller number of shad in many of the past years. They also question various assumptions about whether the actual thermal impact is being accurately measured and whether the actual stream impacts are fully known. ANR itself, the entity that issued the prior NPDES permit, questions whether it is adequately protective at the present time. Other scientific analyses, such as by state and federal governmental scientists on the EAC, are similar. If the VY Station were going to operate for an additional eighteen years, this evidence might cause us to conclude that Entergy VY had not met its obligation to demonstrate that the discharge would not adversely affect the water quality. However, under the Second Amended Petition and the MOU, the VY Station will cease operations at the end of this calendar year. This means that the thermal discharge will occur for at most one spring spawning season, the period that all witnesses agree is the most sensitive for the various fish species in the river. Through the MOU, the Department, ANR and Entergy VY have provided a mechanism to address these short-term concerns. Specifically, these parties have agreed that they will work through the thermal discharge issues as part of the NPDES permit renewal. But more importantly, as an Entergy VY witness testified, the process could allow ANR to address thermal discharges more quickly than through the permit, using other mechanisms.

We find the MOU's treatment of the water quality issues to be an acceptable result. This resolution contemplates that significant judgment will be brought to bear on this matter by the agency with the expertise and primary state responsibility over water quality. We also find it noteworthy that ANR, which had previously asked that we deny Entergy VY's petition on water quality grounds, is now persuaded that the administrative process set out in the MOU is workable and adequately protective of the environment. And we must stress, although there are concerns about the water quality impacts, ***the evidence does not support a finding that there is impairment of the Connecticut River***. This is not to suggest that opponents had the burden of demonstrating such impairment; quite clearly, Entergy VY must show the absence of undue water quality impacts. For the short remaining operational period for the VY Station, we conclude that the have met this showing, subject to the conditions in the MOU that establish a process whereby any issues can be addressed. (Docket 7862, Order of 3/28/14 (Vt. Pub. Serv. Bd.) at 66-68).

The text quoted by ENVY is emphasized in bold and italics above. When read in context, however, it is clear that the PSB found there are concerns about the impact of ENVY's thermal discharge. As noted above, the PSB stated that if the Vermont Yankee (VY) facility were going to operate beyond 2014, the PSB may have found that the discharge would have an adverse effect on water quality. The short term operation of the VY facility combined with ENVY's commitment to address the issues related to the thermal discharge raised before the PSB through the NPDES process, persuaded the PSB to make a positive finding under the applicable Title 30, Section 28 criteria.

What ANR has done through the issuance of this NPDES permit is to address the issues related to the thermal discharge as contemplated in the PSB Order cited by ENVY.

For the reasons sets forth above, ENVY's comment that ANR is legally precluded from altering the thermal discharge limits in ENVY's previous NPDES permit is rejected by ANR. As previously noted, the Environmental Court's decision, and subsequent Vermont Supreme Court decision, was limited to ENVY's proposed 1° F temperature increase. The decisions did not address the full renewal of ENVY's NPDES permit, including the use of Equation 1.1 to determine the thermal discharge limits. In fact, the use of Equation 1.1 is not even referenced anywhere in the Environmental Court decision cited by ENVY. Moreover, ANR's NPDES permit is entirely consistent with Docket 7862, Order of 3/28/14 (Vt. Pub. Serv. Bd.).

COMMENT 2. There is no rational scientific or evidentiary basis for modifying the current permit's existing thermal limitations for the remaining period of VY's operations

Comment 2.1. There is clear proof that VY's historical thermal discharges have caused no prior appreciable harm to, and its current permit is fully protective of, the Connecticut River aquatic community.

Response 2.1. ENVY relies on outdated information and studies which do not definitively demonstrate that there is no prior appreciable harm. The most recent Demonstration compiled by ENVY was based on studies conducted between 1991 and 2001. In addition, many of the prior studies conducted by ENVY's consultants did not adequately investigate the impact of the thermal discharge on the BIP of fish and wildlife in the Connecticut River. For example, juvenile shad outmigration energetics and the effect of VY's thermal discharge into the Vernon dam forebay on juvenile dam passage and survival have never been investigated. Although adult shad energetics was last studied by ENVY in the mid- to late-1990's, the conclusions are inconsistent with a similar peer-reviewed study published by Leonard and McCormick (1999). Note that the ENVY study was not peer-reviewed.

While the compendium of studies has contributed much to our understanding of the biology of the river community and shad biology within a limited portion of the river subject to thermal discharge influence, there are still significant gaps in the studies and information provided by ENVY. As such, ANR continues to have concerns regarding the effects of the thermal discharge on all life that must exist within and/or pass through the thermal discharge.

The Connecticut River is a complex social-ecological system and certainly is not static. Studies conducted twenty, ten or even five years ago are not always consistent with current acceptable scientific methodology and may not reflect conditions of the present time. In 2006, ANR amended ENVY's 2001 discharge permit granting the request for a 1° F increase during the June 16 – October 14 time period. Since that amendment, structural and operational alterations have been made to Vernon, Turners Falls, and Holyoke power stations; additionally, changes to fishways have improved shad passage at those facilities and -- in the case of Vernon power station -- may affect characteristics of the thermal plume discharged from VY.

Comment 2.2. The highest level of shad running since Vernon fish ladders were installed indicates thermal discharge is not a problem.

Response 2.2. Even though improvements made to the Vernon ladder have greatly increased shad passage during the 2012-14 seasons compared to the preceding 15 years (1997 – 2011), passage counts continue to be below the restoration goal. Furthermore, the daily fish ladder count data provides no reliable scientific information about the potential impacts of temperature effects on migrating fish. In fact, this data potentially under-represents the duration and magnitude of temperature conditions and impacts on fish.

The best available information (Castro-Santos, undated draft) strongly suggests fish quickly move upriver from Turners Falls and are delayed before passing Vernon Dam. Temperatures in the Vernon Tailwater and the Lower Vernon Pool could be physiologically disadvantageous to adult shad, especially female fish. Glebe and Leggett's (1981) study of shad migration and bioenergetics demonstrated metabolic energy costs increase with increasing water temperature, stating overall adult mortality is "positively correlated to the thermal regime of the river during migration, being higher in years when the water temperature during migration is higher than average." Likewise, Castro-Santos and Letcher's (2010) dynamic stage model for Connecticut River shad suggests thermal alterations may be partly responsible for reduction in repeat spawners, with thermal environment being one characteristic that affected all three of their model performance variables. Leggett et al. (2004) state the levels of mortality for shad migrating upstream of Holyoke Dam would be elevated at higher temperatures and/or flows due to energetic costs. From the time that adult shad enter the River and migrate upriver to Vernon Dam, they have swum a distance of 142 miles and passed two dams (Holyoke and Turners Falls) and negotiated three fishways. The effects of swimming distance and migration delays are discussed in Castro-Santos and Letcher (2010).

An energetics study of upstream migrating adult shad in the Connecticut river conducted by Leonard and McCormick (1999) found female shad use more energy when migrating between Cabot Station (Turners Falls) and Vernon Dam than when traversing the lower river (Holyoke Dam to Cabot Station).

Disproportionate energy consumption may be influenced by the temperature components of VY's thermal discharge, in addition to the fish ladder and/or power canal. ENVY has not specifically assessed this issue through empirical studies. In their paper on modeling migratory energetics of Connecticut River shad, Castro-Santos and Letcher (2010) state thermal effects on energetics is in need of further study. There are also temperature challenges: natural seasonal increasing water temperatures and heat from anthropogenic sources including thermal discharges and impoundments all which also tax fish energetically and physiologically. Sprankle (2013) states, "Timing, magnitude, duration of thermal exposure(s), and other related effects (e.g., energetic, physiology, movement, passage performance, rates of gonad development) of the VY thermal discharge in species such as American shad have yet to be scientifically examined in the context of current conditions for both Vermont Yankee and its most recent thermal increase, and the Vernon Dam since structural and operational improvements."

Comment 2.3. There is no rational reason for the 71° F measured temperature cap during the Spring Period in order to protect the nonexistent Atlantic salmon smolt. Nor for the 69° F cap in the Fall Period to protect the American shad.

Response 2.3. The Spring Period (April 1-June 30) temperature cap of 71° F was established primarily to protect the spawning of American shad.

Optimum American shad spawning temperature range is reported to be 57.2-71.6° F (Walburg and Nichols 1967; Hightower et al. 2012). As reviewed in Green et al. (2009), most spawning occurs at temperatures between 53.6 and 69.8° F. Leggett and Whitney (1972) report peak spawning movements into rivers occurs at 65.3° F. Walburg and Nichols (1967) report the spawning run peaks at 65° F with a range of 56 to 68° F. Shad spawning runs for populations on both Atlantic and Pacific coasts peak at water temperatures in the range of 60.8 to 67.1° F (Leggett and Whitney 1972). Peak spawning in the Connecticut River was 71.6° F in 1968 (Marcy 1976).

The upper limit of spawning migration temperatures for shad is 67.8° F in North Carolina (Leggett and Whitney 1972) and 73.4° F throughout their range (Walburg and Nichols 1967). The water temperature associated with the end of the spawning migration is 71.6° F (Leggett and Whitney 1972). In the Connecticut River, shad normally discontinue spawning when water temperatures exceed 68° F (Kuzmeskus 1977).

The Fall Period I (September 16 – October 15) temperature cap of 69° F and the Fall Period II (October 16 – November 15) temperature cap of 65° F were established to protect the outmigration of juvenile American

shad by setting up a falling seasonal temperature regime that is reported to have a significant influence on their timely outmigration (Marcy 1976; Weiss-Glanz et al. 1986; Stokesbury and Dadswell 1989).

ENVY presents evidence that juvenile shad demonstrate a wide tolerance to river water temperatures in the range of 50 to 86° F. However, *tolerance* does not imply optimal conditions most favorable to juvenile shad during outmigration.

The onset of juvenile outmigration in the Connecticut River has been reported variously to be 66.2°F (Leggett 1976; O'Leary and Kynard 1986), 73.4-78.8°F (Marcy 1976), and 64.9°F (Watson 1970) (reviewed in Green et al. 2009). *Generally peak migration occurs when temperature drops to between 60.8 and 48.2° F (Leggett and Whitney 1972 and O'Leary and Kynard 1986).* Peak outmigration in the Connecticut River is reported to occur at 60.8°F (Leggett and Whitney 1972; O'Leary and Kynard 1986). Peak periods of outmigration in the Connecticut River ranged from 55.4 and 50.0° F in 1981 and 57.2 and 50.0° F in 1982 (O'Leary and Kynard 1986).

In the Delaware River, it was reported that juveniles only move downstream when the temperature falls below 69.8° F (Sykes and Lehman 1957 in Marcy 2004) and movement peaks at 60° F (Sykes and Lehman 1957 in Weiss-Glanz et al. 1986).

Comment 2.4. ENVY presents scientific literature that demonstrates juvenile shad outmigration is not influenced by temperature at all, but rather is a function of the age and maturity of the juveniles.

Response 2.4. The scientific literature also indicates that there are potential temperature impacts on juvenile shad.

Although O'Donnell and Letcher (2008) and Limburg (1996) lend support to ENVY's case that juvenile shad emigration is "strongly influenced by age and size rather than being driven by temperature cues," these peer-reviewed publications do not argue that age and size operate in exclusion of temperature to influence juvenile shad outmigration behavior and physiology. In fact, there are published papers that show temperature is an important factor (see O'Leary and Kynard 1986; Zudlewski and McCormick 1997; Zudlewski et al. 2003). Several migration theories have been advanced in the peer-reviewed literature: temperature/moon phase (O'Leary and Kynard 1986; Stokesbury and Dadswell (1989), age/growth (Limburg 1996; O'Donnell 2000), and river flow. Sykes and Lehman (1957) described fall downstream migration of juvenile shad from the Delaware River as being dependent on the lowering of the water temperature, or an increase in water flow, or both of these factors. Green et al. (2009) submit that "the

combination of factors that trigger juvenile American shad emigration is uncertain...” Even though ENVY advances an argument that discounts temperature as being a factor influencing juvenile outmigration, the body of other scientific work strongly suggests this may be an over-simplification of the dynamics involved.

Furthermore, the vast majority of juvenile shad produced from spawning and nursery habitats located upriver of Vernon Dam are not exposed to VY’s thermal discharge throughout most of their pre-migrant residency. Once outmigrant shad arrive to the forebay, water temperatures may very well influence their behavior. Much about juvenile fish outmigration remains unknown. It is not well understood how fish respond to *in situ* situations, e.g., the effects that VY’s thermal discharge has on juvenile shad behavior, physiology, and passage success and survival.

The Fall Period I temperature cap was established with respect not only to the outmigration cue, but also to the behavior and physiology *during* outmigration. Outmigrating juvenile shad are provided with one or more alternative routes past the dam with fishways; downstream fish passage facilities mitigate the high mortality resulting from passage through the turbines. However, juvenile shad may avoid these fishways due to VY-heated surface waters in the Vernon Dam forebay, and thereby delaying or avoiding downstream passage. Juvenile fish that are held back or denied expeditious passage may experience potential physiological costs, forced to emigrate via turbine units and/or suffer increased exposure to predators. These unknowns have not been sufficiently addressed by ENVY to assure that no long- or short-term adverse harm is occurring to outmigrating juvenile shad.

COMMENT 3. Modifying ENVY’s thermal discharge permit for only the final four months of operations is inconsistent with the customary five-year permitting scheme, and renders the permit operating fee excessive

RESPONSE 3. ENVY argues that it makes no sense for ANR to modify VY’s thermal discharge limits because (1) the facility will cease operations by December 31, 2014, and (2) the truncated timeframe of the permit would render the permit operating fee as both unreasonable and excessive. Any industrial facility discharging wastewater directly to surface waters is required to hold a NPDES permit. VY is currently operating under an administrative extension of the expired discharge permit issued in July 2001. ANR has the authority and responsibility to renew permits that have been administratively extended. It should be noted that although ENVY’s intention to close the facility means that the thermal discharge will be greatly diminished, and the indications are that a CWA § 316(a) variance will not be required once power production operations have ceased, there will likely continue to be a discharge requiring a NPDES permit.

Despite several requests from ANR, ENVY has not submitted a revised NPDES renewal application indicating what the operating regime will be in terms of the thermal discharge post-operations; therefore, ANR is issuing this permit based on the most recent application on file (received September 29, 2005) that requests a variance from the Vermont Water Quality Standards in accordance with state and federal law. ANR is issuing this permit with a term ending December 31, 2015. ENVY will be required to submit a renewal application detailing the post-closure discharge 180 days before this permit expires.

All discharge permits issued under 10 V.S.A. Chapter 47 are subject to an administrative processing fee of \$120.00 at the time of application, any application review fee, and an annual operating fee. The annual operating fee rate for industrial, noncontact cooling water and thermal discharges is \$0.001 per gallon design capacity, with a maximum fee of \$210,000 (3 V.S.A. § 2822(j)(2)(B)(i)).

CRWC/VNRC Comments.

COMMENT 4. The Vermont Department of Environmental Conservation (DEC) has the authority and responsibility to issue a permit that assures compliance with the CWA, and scientific studies and information supports DEC's conclusion that ENVY's expired permit must be altered to protect aquatic populations of the Connecticut River.

RESPONSE 4. ANR agrees with this comment. See ANR's response to ENVY's comments generally that existing thermal limitations are sufficient to meet applicable standards.

COMMENT 5. ENVY has not met its burden to qualify for a variance from the Vermont Water Quality Standards as set forth in the permit.

RESPONSE 5. ANR has evaluated ENVY's studies, the information submitted by other entities, including the CRWC and VNRC, and relevant peer reviewed scientific studies on thermal impacts on fisheries. ANR's decision is based on all of this information, and the professional judgment of ANR's scientists. ANR denied the variance requested by ENVY in its permit application. However, the information provided by ENVY, combined with the other information ANR considered described herein, supports the thermal limits included in the permit.

COMMENT 6. DEC does not explain how allowing a temperature increase of 13.4° F above ambient (Winter Period) will protect fish against the risks of thermal shock. DEC does not explain how the Winter limits will ensure adequate habitat for yellow perch and walleye.

RESPONSE 6. Fish may experience thermal shock (i.e. heat and/or cold shock) whenever water temperature rapidly increases or decreases outside a particular range of temperatures to which it has been previously acclimated. Thermal shock results in physiological and behavioral responses on the part of the exposed fish and, in some cases, may result in death. The permit retains winter temperature limits ascribed under previously issued permits. The limits are such that temperature increases occur incrementally and gradually, rather than rapidly, enabling fish to acclimate or exercise avoidance behavior should it be necessary. Specifically, the permit includes the following conditions: (1) the temperature at Station 3 shall not exceed 65° F; (2) the rate of temperature change at Station 3 shall not exceed 5° F per hour; and (3) the increase in temperature above ambient at Station 3 shall not exceed 13.4° F. Furthermore, a temperature cap of 65° F is within the tolerance range of most fishes occurring within the vicinity of VY's zone of thermal influence. Nonetheless, ANR has concerns about the effects of added heat to the river during the winter period on certain percid fishes, namely yellow perch and walleye, and possible disruption of their reproductive development (gametogenesis) and subsequent weak or failed year classes. Population abundance trend analyses conducted by Normandeau Associates for years 1991 – 2013 have detected statistically significant increasing trends for yellow perch in both lower Vernon Pool and Vernon Dam tailwater. Correspondingly abundance trends for walleye represent decreasing trends both above and below the dam, but in neither case are the trends statistically significant. These observations do not indicate a problem with either species at the population level, but if VY were to continue power generation and discharging heated water to the river, ANR would require ENVY to undertake studies looking into the reproductive condition and recruitment of both species into their respective populations.

COMMENT 7. CRWC is concerned about what seems to be a serious mismatch between thermal tolerance levels of BIP species and the ambient caps of all seasons.

RESPONSE 7. The upper thermal tolerance levels for each season are not that well known or lack consensus on which reported temperatures are most appropriate for each situation. Nevertheless, the seasonal temperature caps in this permit are protective of the species according to the compiled temperature requirements for a large array of fish species occurring in the Great Lakes many of which occur within the vicinity of VY (including data for 7 of the 9 RIS) (Wismer and Christie 1987), and offer more protection than past limits.

COMMENT 8. DEC has not considered the effects that climate change may have on the outmigration timing for fish in the river.

RESPONSE 8. While climate change is of great concern and the fisheries science community agrees that it poses serious ramifications affecting aquatic environments, fish communities and fisheries into the future, with VY ceasing generation at the end of the current year, it is reasonable to conclude their contribution to warming the Connecticut River will be greatly reduced if not inconsequential within the scope of the greater climate change issue.

COMMENT 9. CRWC supports provisions in the permit that make it more protective of the Connecticut River than the current expired permit. Specifically the provisions related to the use of Equation 1.1 and that take into account life stages of migratory fish.

RESPONSE 9. ANR has not altered the provisions supported by CRWC in the final permit.

COMMENT 10. There should be temperature probes and ambient cap limits in Vernon Pool, the fish passages, and downstream at least as far as Station 3. Station 3 should not be the sole point at which temperatures are monitored in order to determine compliance with ENVY's NPDES permit.

RESPONSE 10. ANR essentially agrees with these recommendations. Currently ambient river temperature is measured at Station 7 located 3.5 miles upstream of VY and temperature due to VY's discharge is measured at Station 3, located 0.65 miles down from Vernon Dam and 1.4 miles down from VY. Additionally, water temperatures at the approximate midpoint within Vernon Fish Ladder are being measured during periods of fishway operation. ANR would consider establishing a fourth compliance point measuring river temperature in the forebay, if VY was to continue generation beyond 2014. Temperatures in the forebay are critical to fish outmigrating from the river upstream of Vernon Dam. Hence establishing a suitable temperature cap during the applicable migration periods, such as apply to shad, would have merit if not for VY not terminating generation at the end of this year

COMMENT 11. The unit of measure for ambient caps should be more frequent than hourly average. Because of the wide temperature fluctuations in the Connecticut River near the VY station, an hourly average ambient temperature cap may not be protective of fish species.

RESPONSE 11. ANR recognizes and accepts that the river is a complex and dynamic system, with variability on both a temporal and spatial scale. However, while increasing the frequency of temperature measurements may serve to illuminate the variability that is inherent in this section of the river, it will not succeed in determining the effect of VY's thermal discharge on the biota. The measured average hourly temperature at Station 3 is the mechanism used to gauge compliance with the temperature caps in the permit; but it is the ongoing biological monitoring that ultimately determines if there is an effect of VY's thermal discharge on the river ecosystem. By its very nature, the biological monitoring assesses the effect of the variability, as well as the average, of the temperature on the BIP.

COMMENT 12. The EAC should not be eliminated.

RESPONSE 12. ANR recognizes and greatly appreciates the extremely valuable role that the EAC has served. However, as ENVY phases out the operation of the VY facility, ANR believes it no longer makes sense, nor is it an efficient use of limited public resources, to maintain the formal role of the EAC as established in previous NPDES permits issued for the VY facility.

COMMENT 13. CRWC raises several issues related to the monitoring provisions of the permit.

Comment 13.1. The time period for larval fish monitoring (in Part IV) may not be sufficient to cover the larval stages of all fishes in the vicinity of the plant

Response 13.1. ANR has had serious concerns regarding VY's entrainment/impingement of aquatic biota and in particular larval and juvenile fishes. Once VY ceases generation at the end of the current year the volume of water diverted from the Connecticut River should be a small fraction of what it has been thereby substantially reducing the entrainment /impingement of aquatic organisms. Nonetheless, the NPDES permit retains conditions for ENVY continuing larval fish and fish impingement monitoring and reporting. While it is true that the required time period for larval fish monitoring (May through July 15) may not overlap with the earliest presence in the river of certain larval fishes (e.g. white sucker, yellow perch, walleye), ANR is comfortable that there is adequate coverage to assess inter-annual changes in larval fish abundance.

Comment 13.2. The Standard Operating Procedures for field sampling should be made available for public notice and comment prior to their approval

Response 13.2. All field sampling is performed according to approved Standard Operating Procedures (SOPs). These SOPs are reviewed and approved by ANR staff according to commonly accepted field sampling principles. ANR is not required to post the SOPs for public comment and such a practice would impact on staff resources and potentially delay sampling.

COMMENT 14. DEC has not explained how VY's continued use of Eq. 1.1 will assure the protection of the BIP. Also, VY's [in]ability to make operational changes is not a sufficient reason to allow the plant to continue using a compliance formula that does not satisfy Vermont Water Quality Standards or 316(a).

RESPONSE 14. ANR believes the imposition of temperature caps based on actual temperature measurements for the seasons deemed appropriate by ANR will assure the protection of the BIP.

COMMENT 15. The permit provides no indication of how long it takes for the VY plant to reduce thermal output of the discharge as necessary to comply with the ambient caps. The lag time between exceedance of the ambient cap and reduction of thermal discharge means that harm to fishes can occur while the plant is adjusting to reach temperatures.

RESPONSE 15. ANR agrees with the request, and has included language accordingly. If the measured average hourly temperature at Station 3 equals or exceeds the specified temperature cap, the Permittee shall, as soon as possible *but within a period no longer than 24 hours*, reduce the thermal output of the discharge to the extent that the measured hourly temperature does not exceed the temperature cap.

COMMENT 16. DEC has not explained how the permit meets the CWA's baseline requirement that facilities use the best technology available to reduce impingement and entrainment. Unless and until DEC is able to determine that technology other than closed-cycle cooling is the best available for minimizing adverse environmental impact, DEC should require VY to operate its already existing closed-cycle towers.

RESPONSE 16. The permit requires ENVY to meet ambient temperature caps for the seasons deemed appropriate by ANR. While the permit does not prescribe how ENVY will reduce its temperature output if the caps are exceeded, ENVY has existing functional cooling towers that it would use to address instances where the cap is exceeded. Accordingly, ANR finds that to the extent ENVY is required to take action to reduce its thermal

discharge to meet effluent limitations during the term of this permit, the use of the existing cooling water infrastructure is the best technology available.

Public Comments.

COMMENTS 17.

- The permit does not require closed cycle cooling so there is still a thermal discharge to the river.
- Please make sure ENVY uses their cooling towers for at least 6 months. Protect our river.
- Closed cycle cooling is the answer-plain and simple.
- I ask you to require ENVY to use their closed loop cooling towers in their reactor process.
- ENVY is discharging water that is increasing the temperature of the Connecticut River more than is allowed by regulations. They have cooling towers to be used in this case. Why is the ANR refusing to enforce such a simple and straight-forward operation as is called for?
- I ask you to require ENVY to stop discharge of thermally heated water into the Connecticut River.
- Why are you allowing VY to continue to pollute the Connecticut [R]iver for another six months?
- I ask you to protect the environs of the [Connecticut] River and protect a naturally flowing river and its occupants.

RESPONSE 17. ANR is obligated to make a determination on a NPDES permit renewal in accordance with all applicable state and federal requirements. During the permitting process, ANR assessed whether the thermal component of the discharge and the cooling water intake structures met the requirements of both the CWA and the Vermont Water Quality Standards.

ANR has concluded that VY qualifies for a variance from the temperature criteria established in Section 3-01 B.1. of the Vermont Water Quality Standards, but has revised from the previous permit the thermal discharge effluent limitations and conditions to assure the protection and propagation of aquatic biota, as well as compliance with the Vermont Water Quality Standards.

The Facility has cooling water infrastructure in place, and the capacity to operate in closed cycle cooling. Accordingly, ANR finds that to the extent ENVY is required to take action to reduce its thermal discharge to meet effluent limitations during the term of this permit, the use of the existing cooling water infrastructure is the best technology available.

COMMENT 18. The highest temperature limit is still set at 85° F, way above a fish-friendly level.

RESPONSE 18. In this permit, several additional periods have been designated to better mirror the seasonal biology of the species in the Connecticut River. The Spring Period, previously ending June 15, was extended through June 30; and two new periods were introduced: Fall I (September 16-October 15) and Fall II (October 16-November 15). These revised seasonal periods correspond to the biological/life history requirements of anadromous and resident fishes inhabiting and/or migrating through portions of the Connecticut River affected by the Facility's thermal discharge. The upper temperature limit within each period has been established based on the specific stage of these inhabiting and/or migrating anadromous and resident fishes.

While the Summer Period temperature cap of 85° F is retained from the previous permit, the time frame is significantly shorter: it was June 16-October 14 in the previous permit (120 days), and is July 1-September 15 (76 days) in this permit. The Summer Period temperature cap of 85° F approximates the avoidance temperature of most representative important species (RIS) and is below the upper incipient lethal temperature for all species (except Atlantic salmon) during this seasonal time frame; Atlantic salmon are highly unlikely to be migrating through this area during this defined period.

COMMENT 19. The permit does not lower the winter temperature at all leaving the present harmful levels in place.

RESPONSE 19. Under the provisions of both §316 of the CWA and the Vermont Water Quality Standards, alternative thermal limits may be granted where a demonstration can be made that such alternative limits will not result in an adverse effect on biota. In 1978, a 316 Demonstration was submitted and then approved by ANR which allowed a temperature increase during the winter months (October 15 – May 15) beginning with the 1978 permit.

ANR has determined that the discharge, under the thermal effluent limitations of previously issued permits, has resulted in no appreciable harm to the aquatic biota of the Connecticut River within the area influenced by the thermal discharge during the Winter Period. Therefore, the thermal limitations for the Winter Period will be retained from the previous permit. The limits are such that temperature increases occur incrementally and gradually, rather than rapidly, enabling fish to acclimate or exercise avoidance behavior should it be necessary. Specifically, the permit includes the following conditions: (1) the temperature at Station 3 shall not exceed 65° F; (2) the rate of temperature change at Station 3 shall not exceed 5° F per hour; and (3) the increase in temperature above ambient at Station 3 shall not exceed 13.4° F. Furthermore, a temperature cap of 65° F is within the tolerance range of most fishes occurring within the vicinity of VY's zone of thermal influence.

COMMENT 20. The continued use of the river for cooling means larval fish will continue to be killed when they are pulled into the cooling water intake at unacceptable rates.

RESPONSE 20. ANR has had serious concerns regarding VY's entrainment/impingement of aquatic biota and in particular larval and juvenile fishes. Once VY ceases generation at the end of the current year the volume of water diverted from the Connecticut River should be a small fraction of what it has been thereby substantially reducing the entrainment /impingement of aquatic organisms. Nonetheless, the NPDES permit retains conditions for ENVY continuing larval fish and fish impingement monitoring and reporting.

COMMENT 21. There are reports of the production of Strontium 89 and 90 by VY. Strontium is produced in particulate form, and goes out as dust from the stacks and winds up in the river. In 2010, the Brattleboro Reformer reported that Strontium 90 was found in a fish near VY. Strontium 90 has a half-life of 27.9 years and causes Leukemia.

RESPONSE 21. Although Section 502(6) of the CWA defines the term pollutant to include radioactive materials, EPA has refined the definition of pollutant in its implementing regulations (e.g., 40 C.F.R. Part 122) to exclude radioactive materials regulated under the Atomic Energy Act of 1954, as amended. Thus, source, byproduct, and special nuclear material – such as Strontium – are subject to regulation under the Atomic Energy Act, *not* the CWA (or the NPDES discharge permit).

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