STATE OF MICHIGAN

COURT OF CLAIMS

DAVID KRIEGER, et al.,

Plaintiffs,

v

Case No. 20-000094-MM; 20-000102-MM; 20-000103-MM; 20-000111-MM; 20-000112-MZ; 20-000116-MM; 20-000118-MM; 20-000121-MM; 20-000140-MM; 20-000151-MM; 20-000156-MM; 20-000230-MM; 20-000232-MZ; 20-000233-MM; 20-000235-MM; 20-000236-MM; 20-000237-MM; 20-000239-MM; 20-000240-MZ; 20-000241-MM; 20-000245-MM; 20-000246-MM; 20-000257-MM; 20-000260-MM; 20-000262-MM; 23-000073-MM; 23-000074-MZ; 23-000076-MM

Hon. James Robert Redford

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY, and MICHIGAN DEPARTMENT OF NATURAL RESOURCES,

Defendants.

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OPINION AND ORDER ON LIABILITY

APRIL 23, 2026

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I. DECISION

The matter before the Court involves claims by several thousand individual plaintiffs as well as class action plaintiffs who allege that the Michigan Department of Environment, Great Lakes & Energy (EGLE) and the Department of Natural Resources (DNR) inversely condemned their properties in violation of the Constitution, statutes, and caselaw of the state of Michigan. Plaintiffs allege they are entitled to a judgment that defendants are liable to them for these violations and that the case should continue to the issue of damages and a damages trial.[1]

The Court concludes, for the reasons which will be set forth below, that defendants did not inversely condemn plaintiffs' property. As a result, judgment against plaintiffs on the issue of liability will be entered in this matter which will be a final order in the case.

II. OVERVIEW

On May 19, 2020, at 5:35 p.m., following several days of substantial rainfall which resulted in Wixom Lake rising to a level five-and-a-half feet above normal lake level, and three feet higher

[1] The parties recommended in the fall of 2024 that this case should be bifurcated. Bifurcation allows a trial on whether or not there is liability for the claims a plaintiff or plaintiffs raise. In such a case, if the Court finds liability, then a second phase of the case takes place with further discovery and a trial on the individual claims of damages. The bifurcation was suggested by counsel at a September 9, 2024 in-chambers meeting following a hearing. On September 17, 2024, the Court issued a Notice of Potential Bifurcation and Request for Counsels' Input and on October 10, 2024, issued an Order bifurcating the trial. No objections were interposed to this manner of proceeding.

than the previous recorded highest lake level (which occurred in 1929), the left side[2] of the earthen embankment of the Edenville Dam failed. The dam failed as a result of static liquification.[3]

This failure resulted in catastrophic damage to property downstream, the failure of the Sanford Dam May 19, 2020, at 8:20 p.m.,[4] and the emptying of 2 lakes that had been in place for close to 100 years. The damage to property was estimated in the hundreds of millions of dollars.[5] Thankfully, there was no known loss of life as a result of these dam failures.[6]

While the Court, as indicated above, has concluded that that which took place is not the result of an inverse condemnation under Michigan law, this does not mean that what plaintiffs suffered and continue to suffer is not an immensely difficult and heavy burden. When the Edenville Dam breached that evening in May 2020 and the waters of this river went downstream, the persons, families, communities, and business owners who had primary residences, family cottages and cabins, businesses, favorite campsites, and other places of recreation and enjoyment

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[2] Left and right sides of a dam, per the witnesses and reports in this case, are determined from the perspective of a person looking at the dam from the upstream vantage point. So, the "left" side of the Edenville Dam could also be referred to as the east side of the dam.

[3] Static liquification is a process whereby saturated, loose soil suddenly switches from a drained state to an undrained state which causes it to lose shear strength and the soil becomes unstable.

[4] The Sanford Dam was the next dam downstream from the Edenville Dam on the Tittabawassee River.

[5] See Independent Forensic Team (IFT) Final Report, May 2022

[6] Those who have studied these failures ascribe the absence of loss of life to many things but specifically include the organized and effective work of the Emergency Managers of Gladwin and Midland Counties and particularly the decision of the Midland County Emergency Manager to declare an evacuation order for the persons and property downstream from the Edenville Dam during the evening of May 18, 2020.

on these waterways suffered an incalculable loss. The impact of that day and the days leading up to it and since will be felt by all those alive that day and for many years to come.

While all the world will remember 2020 as before and after COVID, those of our fellow Michiganders who called Wixom and Sanford Lakes and those downstream from them, as their places of peace, family and individual contentment; their individual and collective reference point will likely also be "before the dam failed" and "after the dam failed".

The Court recognizes these losses. They are real and lasting.

A. ELEMENTS OF INVERSE CONDEMNATION

Plaintiffs' claim for liability rests on a theory of inverse condemnation. Inverse condemnation is "a cause of action against a governmental defendant to recover the value of property which has been taken in fact by the governmental defendant, even though no formal exercise of the power of eminent domain has been attempted by the taking agency." *In re Land—Virginia Park Acquisition*, 121 Mich App 153, 158-159; 328 NW2d 602 (1982) (citation and quotation marks omitted). Often referred to as a de facto taking, this claim has its foundations in Article 10, § 2 of Michigan's 1963 Constitution, which declares in pertinent part that "Private property shall not be taken for public use without just compensation therefore being first made or secured in a manner prescribed by law." Const 1963, art 10, § 2. To prevail in this litigation, plaintiffs bear the burden of establishing "(1) that the government's actions were a substantial cause of the decline of the property's value and (2) that the government abused its powers in affirmative actions directly aimed at the property." *Mays v Governor*, 506 Mich 157, 173; 954 NW2d 139 (2020), quoting *Blue Harvest, Inc v Dep't of Transp*, 288 Mich App 267, 277; 792 NW2d 798 (2010).

Inverse condemnation may be found where there is a causal connection between an overt action by the governmental entity that is specifically directed toward a plaintiff's property, which constitutes an abuse of legitimate governmental power, and is a substantial cause of a permanent deprivation of the property owner's use or possession of their property in whole or in substantial part. *Hinojosa v Dep't of Natural Resources*, 263 Mich App 537, 548-550; 688 NW2d 550 (2004); *Merkur Steel Supply, Inc v Detroit*, 261 Mich App 116, 125; 680 NW2d 485 (2004); *Charles Murphey, MD, PC v Detroit*, 201 Mich App 54, 56; 506 NW2d 5 (1993). "[N]o exact formula exists . . . instead, the form, intensity, and the deliberateness of the governmental actions toward the [plaintiffs'] property must be examined." *Merkur Steel Supply, Inc,* 261 Mich App at 129-130. A threat of condemnation, by itself, is not sufficient. *Heinrich v Detroit*, 90 Mich App 692, 698; 282 NW2d 448 (1979). Nor are allegations that the government failed to abate a nuisance, acted negligently in issuing a license or permit, expressly declined to compel compliance with a regulatory code, or denied a proposal to remedy damage caused by another private property owner. *Attorney Gen v Ankersen*, 148 Mich App 524, 545-546; 385 NW2d 658 (1986); *Hinojosa*, 263 Mich App at 549-550; *Marilyn Froling Revocable Living Trust v Bloomfield Hills Country Club*, 283 Mich App 264, 296; 769 NW2d 234 (2009). Actions that have an indirect consequence of substantially damaging a plaintiff's property may be sufficient when the action was the "natural and direct result" of the government's actions and the government was forewarned that this result would occur. *Peterman v Dep't of Natural Resources*, 446 Mich 177, 190-191; 521 NW2d 499 (1994).

Our Court of Appeals previously determined that the allegations in plaintiffs' complaint are sufficient to plead a cause of action for inverse condemnation. *Krieger v Dep't of Environment, Great Lakes, and Energy,* 348 Mich App 156, 185-186; 17 NW3d 700 (2023). With respect to

allegations that defendants took affirmative actions directly aimed at plaintiffs' property, the Court of Appeals began by setting forth those allegations that are not sufficient. Specifically, neither an "alleged misfeasance in licensing and supervising," nor inaction and omission by the state are sufficient. *Id.* at 183-185. Rather, the Court of Appeals stated as follows:

> In this case, plaintiffs alleged that defendants knew about the Edenville Dam's inability to withstand significant rainfall because of insufficient spillway capacity and knew that the dam's poor conditions posed a danger to the surrounding area and properties. Plaintiffs also alleged that defendants actively prevented efforts to repair the dam and threatened enforcement actions if the water levels were drawn down. Finally, plaintiffs claimed that defendants acted to conceal the risks posed by the dam and to raise the lake levels to dangerous levels because they were more concerned with protecting environmental conditions in the lake. Accepting these allegations as true, plaintiffs sufficiently pleaded affirmative actions taken by defendants that were aimed directly at plaintiffs' properties. [*Id.* at 185-186.]

Importantly, the Court of Appeals described these allegations as "demonstrat[ing] more than mere regulatory actions, such as issuing or denying a permit . . . or failing to abate a nuisance." *Id.* at 185-186. "Rather, plaintiffs' allegations show active steps by defendants to authorize higher lake levels and to conceal critical information about the risk that the dam's condition posed to plaintiffs' specific properties in the surrounding area." *Id.* at 186. "Put differently, plaintiffs alleged that defendants' affirmative actions 'set into motion the destructive forces' that caused the dam failure and damage to plaintiffs' properties that were in the direct line of harm." *Id.*

The Court of Appeals also disagreed with defendants that plaintiffs' inverse-condemnation claim fails because defendants did not put plaintiffs' property to a public use. In this case, "plaintiffs alleged that defendants exercised control over the Edenville Dam so much so that their use of the dam constituted a public use." *Id.* at 191. "[T]he relevant question is whether defendants took plaintiffs' property by controlling the operation of the dam for a public use, not whether plaintiffs' property—once taken—would be put to a public use." *Id.* Relevant to this analysis

were allegations that "defendants pressured [Boyce Hydro Electrical Company, LLC (Boyce)] to keep water levels high to protect aquatic life, prioritizing that interest at the expense of the safety of people and property." *Id.* These allegations were sufficient to state a legally cognizable claim, while "discovery may reveal facts contradicting these allegations." *Id.* The Court of Appeals disagreed with defendants that plaintiffs' claims were "so clearly unenforceable that no factual development could possibly justify recovery." *Id.* at 191 (citation and quotation marks omitted).

In reaching this decision, the Court of Appeals relied heavily on an earlier opinion from our Supreme Court, which also considered a motion for summary disposition under MCR 2.116(C)(8), but in the context of the Flint Water Crisis. Like the Court of Appeals' decision in *Krieger*, the Court's consideration was limited to allegations in the pleadings and not evidence at trial. Specifically, the plaintiffs in *Mays* alleged that a state employee, i.e., an emergency manager, contractually bound Flint to a program altering the water supply. The plaintiffs alleged that "the Governor and various state officials knew that the Flint River would serve as the interim source of drinking water for the residents of Flint . . . despite knowledge of a 2011 study . . . of drinking water and despite the absence of any independent state scientific assessment of the suitability of using water drawn from the Flint River as drinking water." *Mays*, 506 Mich at 168-169. The first element of an inverse-condemnation claim was satisfied by allegations that "switching the water source . . . resulted in physical damage to pipes, service lines, and water heaters" and, also, that the "contaminated water limited the use of their property and substantially impaired its value and marketability." *Id.* at 174-175. The second element was satisfied by allegations that the decision to authorize the "use [of] the Flint River as an interim water source while both sets of defendants knew that using the river could result in harm to property" and "allegedly concealed or misrepresented data and made false statements about the safety of the river water in an attempt to

downplay the risk of its use and consumption." *Id.* Like the Court of Appeals' earlier decision in *Krieger*, our Supreme Court recognized that "discovery may bear evidence" refuting these elements but at that stage of proceedings (i.e., on a motion for summary disposition under MCR 2.116(C)(8)), the Court "must accept all of plaintiffs' allegations as true." *Id.* at 175. "If true, plaintiffs' allegations are sufficient to conclude that the state defendants abused their powers and took affirmative actions directly aimed at plaintiffs' property." *Id.*

B. EVIDENCE CONSIDERED

The evidence includes the live and recorded witness testimony presented over 11 full days of trial from January 12, 2026, until January 26, 2026. Here is an identification of the witnesses and their relevant qualifications:

- Mario Fusco, M.S., P.E., a hydraulic engineer, began working for the state of Michigan in June 2003 and served as the supervisor of what was then known as the Hydrologic Studies and Dam Safety Unit of EGLE[7] for approximately 2½ years beginning June 2018.
- James Pawloski, P.E. served as a dam safety engineer with EGLE throughout his approximately 30-year career that started in January 1989. In his last position, he was responsible for administration of the dam safety statute over a selected area in the northern lower peninsula and the entire upper peninsula.
- Teresa Seidel served as the Director of the Water Resource Division at EGLE from 2016 until approximately November 2023.
- Lucas Trumble, P.E., served as the Regional Engineer in the Dam Safety Unit of EGLE at the time the Federal Energy Regulatory Commission (FERC) revoked the Edenville Dam's license and through the date the Edenville Dam failed in May 2020. He was promoted to supervisor of the Dam Safety Unit in February 2021 and, then, to section manager of the Field Operations Engineering and Enforcement

[7] Effective April 7, 2019, and per Executive Order 2019-02, the Department of Environmental Quality (DEQ) was renamed the Department of Environment, Great Lakes and Energy (EGLE). For purposes of this opinion and order, all references to EGLE shall be considered as referring to EGLE or DEQ as appropriate.

Section of the Water Resources Division of EGLE at the time of trial. He worked under Fusco and Seidel during all times relevant to this case. Trumble testified as a fact witness at plaintiffs' request and, also, as an expert witness on behalf of defendants.

- Brian Rudolph, an environmental manager, served as the District Supervisor of the Bay City District Office, Water Resources Unit within the Water Resources Division of EGLE.

- Kyle Kruger served as a Senior Fisheries Biologist for the Michigan DNR at the time of his retirement in 2021/2022. Hired by the state in 1987, Kruger began monitoring environmental and recreational aspects of FERC licenses on behalf of the state from approximately 1998 until his retirement.

- Jessica Mistak was Kruger's supervisor and serves as a Habitat, Aquatic Species and Regulatory Affairs Section Manager of the DNR.

- William Sturtevant, P.E., a licensed professional engineer, testified to decades of experience as a state and municipal regulator in the area of dam safety in Wisconsin and Colorado Springs, CO. He testified as an expert witness on plaintiffs' behalf.

- Bryan Rappolt, a registered meteorologist with more than 33 years' experience, testified as an expert witness on plaintiffs' behalf and offered his opinions on the field of meteorology, as well as the amount and timing of five rainfall events leading up to the failure of the Edenville Dam.

- David Williams, Ph.D., P.E., P.H., CFM, CPESC, F.ASCE, BC.WRE, a certified professional hydrologist, testified as an expert witness on plaintiffs' behalf to present a forensic analysis of hydrology and Wixom Lake levels preceding and immediately after the events of May 19, 2020. In addition, he was retained to create a dam breach hydrograph due to the failure of the Edenville Dam, to analyze and present results of scenarios for operation of the Edenville Dam, and to review and critique the hydrologic opinions as expressed by the IFT authors in the IFT report.

- W. Allen Marr, P.E., Ph.D., NAE, a geotechnical engineer with 50 years' experience, testified as an expert witness on plaintiffs' behalf with respect to geotechnical information related to the dams generally, including the water levels at which the Edenville Dam could have been expected to fail and the impacts of certain changes to the dam that may have impacted this failure.

- Susan Griener serves as a senior hydrologist in EGLE's Flood Management Unit.

- Richard Dee Purkeypile, P.E., provided engineering services to Boyce, including preparing technical memorandums and FERC-required reports and analyses on more than one occasion prior to the Edenville Dam's failure.

- David Kepler serves as the Chairperson and President of the Four Lakes Task Force (FLTF), a private 501(c)(3) organization that is the delegated authority under Part 307 of the Natural Resource and Environmental Protection Act, MCL 324.101, *et seq.*, (NREPA) for Gladwin and Midland Counties.[8]

- John W. France, P.E., D.GE, D.WRE, a professional engineer with a specialization in geotechnical engineering and more than 50 years' experience as a consultant in dam engineering and dam safety, testified on defendants' behalf and as the team leader for the IFT.

- Frank Christie, a professional engineer, was employed by Boyce as a general manager of the Edenville Dam from approximately 2000 until 2017.

- Gregory Uhl, was the chief operating dam operator for all four Boyce dams and is currently employed by the FLTF.

- Scott Olson, Ph.D., P.E., is a professor at the University of Illinois, with a bachelor's, master's, and doctorate in civil engineering. He testified on defendants' behalf as an expert witness in geotechnical information and, in particular, static liquefaction flow factors. The latter was the focus of his Ph.D. program.

The Court also considered all exhibits and stipulations of the parties and everything else agreed to as evidence.[9]

Additionally, the Court had the benefit of being the assigned judge in this matter since late January 2024. In that capacity, the Court has met with assigned counsel quarterly in-person or via

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[8] "Part 307" as used throughout this opinion and order refers to Part 307 of the NREPA, which describes regulatory authority and requirements related to inland lake levels. Among other things, Part 307 authorizes a county board or EGLE to petition a local circuit court to determine the normal level of an inland lake. MCL 324.30702; MCL 324.30704; and MCL 324.40706. A "delegated authority" is the person "designated by the county board to perform duties required under [Part 307]." MCL 324.30701(e).

[9] The exhibits included many thousands of pages of documents. Plaintiffs introduced over 400 exhibits, both digitally and in printed form, which were contained in seven 4-inch binders. Defendants introduced over 150 exhibits, both digitally and in printed form, which were contained in four 4-inch binders, and one 3-inch binder. The testimonial and documentary evidence has been considered by the Court.

Zoom status conferences, and rendered decisions on numerous motions, including those for summary disposition, and a wide variety of other topics.

C. INDEPENDENT FORENSIC TEAM REPORT

One document cited by the parties and most of the experts is the Independent Forensic Team (IFT) report. Following the failure of the Edenville and Sanford Dams on May 19, 2020, FERC and EGLE collectively directed the private owner of the dams, Boyce, to "engage a fully independent forensic investigation team to develop findings and opinions on the causes of the failures." The team was to consist of experts in the following areas: hydraulics and hydrology, geotechnical engineering, structural engineering, reservoir operations, emergency action planning, and organizational/human factors. Boyce was to select the team members. The members were not to have worked on a Boyce project in the past. In June 2020, FERC and EGLE approved the following individuals to serve on the IFT in the following roles in the investigation:

- John W. France, P.E., D.GE, D.WRE, JWF Consulting LLC – Team Leader, Geotechnical Investigation and Analysis, and Emergency Response Evaluation
- Ifran A. Alvi, P.E., Alvi Associates – Human Factors Investigation and Analysis, Emergency Response Evaluation, Hydrologic Investigation and Analysis, and Geotechnical Analysis
- Arthur C. Miller, Ph.D., P.E., P.H., D.WRE, AECOM – Hydrologic and Hydraulic Investigation and Analysis, and Reservoir Operations Evaluation
- Jennifer L. Williams, P.E., AECOM – Geotechnical Investigation and Analysis
- Steve Higinbotham, P.E., Independent Consultant – Hydraulic Structures Evaluation

On or around July 31, 2020, Boyce filed for bankruptcy and the IFT ultimately contracted with FERC instead of Boyce, but still carried out its work independently. John France, a member and the team leader of the IFT, testified at trial. France explained that certain sections of the report were sent to persons or entities who had involvement with the dam and who had been interviewed

by the IFT for the purpose of fact-checking. The report as a whole, including the IFT's analysis and conclusions, was not reviewed by Boyce, EGLE, FERC, or the FLTF prior to publication of an interim report issued on September 13, 2021, for comment.

To prepare its report, the IFT reviewed available information, interviewed numerous persons, and performed engineering analyses for the purpose of evaluating "physical and human factors that contributed to the failures and to identify lessons to be learned by the industry, emergency management agencies, and the public to prevent future similar failures." More specifically, the IFT reviewed documents related to the original design and construction of the dam, as well as logs, records, prior inspection reports, and evaluations, etc., related to the governance, guidance, and procedural documents for "applicable dam safety, operation, and maintenance organization associated with the Boyce Hydro dams." Two IFT members conducted on-site visits in 2020 in which they visibly inspected the dam and gathered soil samples for field geotechnical investigations and analysis.

The IFT also interviewed Boyce operators, EGLE personnel, and FERC personnel, as well as local residents, eyewitnesses, and others. These interviews occurred via Microsoft Teams. Most were in-depth and lasted more than an hour. In addition, the IFT performed hydrologic and hydraulic analyses to simulate the May 2020 rainfall/runoff event for the Sanford watershed and conducted field geotechnical investigations and analysis in the laboratory. Over 50 IFT working sessions were held to collectively discuss and evaluate factual information, to develop opinions, to engage with other experts regarding static liquefaction and seasonal watershed characteristics, and to prepare an interim report that "focused on the physical mechanisms contributing to the failures."

The final report was issued in May 2022. Its nine sections identify: (1) an introduction to the scope and approach of the investigation, (2) a brief description of the four Boyce dams, (3) a chronology of the dams' failures, (4) the IFT's "findings concerning the physical mechanisms of the failures," (5) an evaluation of the flood event and the effect of operations, (6) an evaluation of the effectiveness of the emergency response actions, (7) the IFT's "findings concerning the human factors contributing to the failures," (8) "a summary of lessons to be learned," and (9) "a list of references used throughout the course of the investigation." Many of the IFT's data and findings were relied on by the expert witnesses in this case.

Specifically, the IFT identified the "physical mechanism" of the dam's failure as static liquefaction, i.e., a "sudden loss of soil strength" in one section of the embankment, which resulted in "instability failure of the downstream slope and then breach of the reservoir through the dam." The IFT found that this occurred when Wixom Lake "reached a level that was 3 feet higher than the previous high level which occurred in 1929," and its flood waters caused an overtopping failure of the Sanford Dam. The "unusually high lake level" was caused by "an unusual and unfortunate combination of factors related to where and when the rain fell, and unusually impervious ground conditions which greatly increased the runoff from the raising, resulting in 100-to-200 year flooding being produced by a 25-to-50-year rainfall." However, the IFT was "confident that the embankment did not overtop" because "there is no evidence of water flowing across the crest and no observed evidence of water on the downstream face of the dam until less than 4 minutes, and likely just seconds, before the failure."

According to the IFT report, static liquefaction is a rare, but not unprecedented, failure mechanism for water storage dams that had not typically been considered by geotechnical

engineers. Geotechnical engineers have generally assumed that, under loading conditions other than earthquakes, "water will be able to flow in and out of sands readily and [sand] will behave drained during shear, with the strength defined by the drained shear strength, regardless of the density of the sand." Nonetheless, the IFT identified several bases supporting the conclusion that the dam failed because of static liquefaction and, "[a]lthough there is uncertainty concerning the exact trigger or triggers that led to the static liquefaction failure, there are several phenomena that are plausible triggers, either individually or in some combination" including the record lake level at the time of the failure.

The IFT did not attribute the failure to any one factor. It explained as follows:

> The May 2020 failure of Edenville Dam was a result of interactions of numerous physical and human factors, beginning with the design and construction of the project in the 1920s and continuing throughout the life of the project until the failure. During the nearly 100 years the project was in place prior to failure, incorrect conclusions were drawn regarding the stability of the Edenville Dam embankments and the capacity of the spillways. The potential for a non-extreme rainfall event to result in the lake rising by several feet to near the embankment crest was not recognized, and judgments and decisions were made that eventually contributed to the failure or to not preventing the failure.
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> The extent to which the numerous contributing factors combined and aligned to result in the failure primarily reflects both deficiencies in the construction of Edenville Dam and deficiencies in subsequent industry practices during the history of the project. The failure also secondarily involves an unfortunate combination of factors related to the variability of the dam along its length, the variations in the seepage behavior of the dam, the embankment stability analyses that were and were not performed, the hydrologic characteristics of the May 2020 storm event, and the timing of that storm event relative to planned upgrades to the Edenville gate hoist systems and spillways.
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> The IFT understands the natural desire to place "blame" for the failure. However, the IFT found that the failure cannot reasonably be attributed to any one individual, group, or organization. Instead, it was the overall system for financing, designing, constructing, operating, evaluating, and upgrading the four dams, involving many parties during the nearly 100 years of project history, which fell short in ensuring a safe dam at the Edenville site. All of the parties associated with the dams can be seen as having been acting "rationally" relative to their respective

> incentives, disincentives, responsibilities, and constraints. However, collectively, they were operating within a system that had conflicting interests and goals, resulting in the system having non-cooperative relationships. The net result was the failure of Edenville and Sanford Dams, which was a negative outcome for *all* of the parties.

The IFT report notes that the gates were opened only about seven feet, limiting the flow through the spillways. If all six gates had been opened to a height of at least ten feet, the IFT estimated that maximum lake level would have been approximately "1.1 feet lower than the lake level at the time of failure, at El. 680.2." Moreover, the IFT estimated that a pre-lowering to run-of-the-river with all gates open to 10 feet would have only lowered the maximum lake level by about 1.4 feet relative to the level at the time of failure. It was "uncertain" whether this would have prevented the failure because Wixom Lake would likely have stayed at "a relatively high level for several hours."

The IFT reported that the dam failures were foreseeable and preventable. Its report cites construction methods that apparently deviated from the design plans and construction specifications; earlier embankment stability analyses that were insufficient to evaluate the stability of the entire length of the embankment and, therefore, failed to identify any deficiency; and environmental factors including the surrounding area's ability to "generate unusually high runoff" such that the rise in the lake level was foreseeable but unnoticed because the "engineers involved in the project were focused on regulatory requirements of FERC and then EGLE." These regulatory requirements required the dam be able to pass "extreme floods, resulting from extreme rainfall without overtopping." Moreover, the revenue from generating power was insufficient to fund a spillway capacity upgrade, "which would have cost several million dollars." The IFT surmised that if the dam had come under public ownership, "sufficient funds would have been available to upgrade the spillway capacity to pass an extreme flood." This rise in lake level in

May 2020 would have been "limited" and "the failure would almost certainly have been prevented." However, even in this scenario, the embankment remained "vulnerable to instability failure during extreme floods" without modifications to increase its stability.

The IFT identified "[t]wo significant hydrologic and hydraulic factors" involved in the Edenville Dam failure, i.e., "the unusual characteristics of the May 2020 rainfall event and the response of the watershed to this rainfall and (2) a lack of understanding of the hydrologic risk of high lake levels at or near the embankment crest."[10]

III. BACKGROUND AND FACTUAL FINDINGS

A. HISTORY OF THE EDENVILLE DAM AND OTHER DAMS ON THE TITTABAWASSEE AND TOBACCO RIVERS

The Edenville Dam is one of four dams constructed by Holland, Ackerman, and Holland along the Tittabawassee and Tobacco Rivers in Gladwin and Midland Counties between 1923 and 1925. It impounds Wixom Lake, a 2,300-acre reservoir with a gross storage capacity of about 40,000 acre-feet and a 49-mile-long shoreline at full pool. Upstream from the Edenville Dam on the Tittabawassee River are the Smallwood Dam and the Secord Dam, which impound reservoirs bearing their respective dam's name, and downstream was the Sanford Dam, which also failed as a result of the Edenville Dam's failure on May 19, 2020. In April 2019, at least 6,555 parcels of

[10] The Court acknowledges, as reported by the parties during the course of these proceedings, that federal cases regarding the Edenville Dam failure were also filed, and that the federal courts rendered opinions that included references to the IFT report. These cases include *Bruneau v Mich Dep't of Environment, Great Lakes & Energy*, 104 F4th 972, 976-977 (CA 6, 2024); and *Mich Dep't of Environment, Great Lakes & Energy v Mueller*, opinion of the United States District Court for the Western District of Michigan, issued Oct 6, 2023 (Case No. 1:20-cv-528), p 2. The Court has not based its factual findings or legal conclusions in these matters on the findings or conclusions made in those actions.

private property fronted these lakes, and 1,961 parcels of private property held dedicated easement access to the lakes.

The Edenville Dam is an earthen dam with two gated spillways, one on the Tittabawassee River and the other on the Tobacco River. A powerhouse is located adjacent to the Tittabawassee spillway, followed by two earthen embankments totaling approximately 6,200 feet in length with a maximum height of 54.5 feet. Photographs from the original construction indicate that the dam was constructed by dumping fill materials from trestles into portions of the embankment. Engineering reports conducted to satisfy federal regulatory requirements in 2010 and 2015 noted this method of construction and recognized that while it provides little means of compaction, there had been "relatively few problems with the embankments" in the more than 80 years of the dam's existence.

The Edenville Dam is classified as a high hazard potential dam, which is defined as follows in MCL 324.31503(11):

> [A] dam located in an area where a failure may cause serious damage to inhabited homes, agricultural buildings, campgrounds, recreational facilities, industrial or commercial buildings, public utilities, main highways or class I carrier railroads, or where environmental degradation would be significant, or where danger to individuals exists with potential for loss of life.

The dam was constructed for the purpose of generating hydroelectric power and FERC licensed it for this purpose in 1998. The FERC license required its owners to maintain both a summer and winter lake level. The summer or "normal" lake level was El. 675.8 feet[11], with fluctuations of

[11] This is the feet above sea level. It is not indicative of the depth of the water. At least two ways of referring to this measurement are included in the record. Specifically, the IFT referred to the water level as "El. 675.8," or "Elevation of 675.8 feet." The May 28, 2019 Order of the Midland Circuit Court described the normal summer lake level as "675.8 NGVD 29 (or 675.2 NAVD 88)"

between +0.3 feet and -0.4 feet allowed. Winter drawdowns were to begin after December 15 and needed to be completed by January 15. The minimum lake level during winter operations was 672.8 – 3 feet below normal pool level, with a daily fluctuation not to exceed 0.7 feet. The lake was to be returned to normal pool level when the surface temperature of the reservoir reached 39 degrees Fahrenheit.

Per Order dated September 10, 2018, FERC revoked Boyce's license to generate hydroelectric power. Fifteen days later, on September 25, 2018, EGLE assumed regulatory authority of the Edenville Dam.

B. OWNERSHIP, ACCESS, AND OPERATIONS OF THE EDENVILLE DAM WERE CONTROLLED BY A PRIVATE ENTITY

At all times relevant to this litigation, the four dams were owned by a private entity, Boyce Hydro Power, LLC, with operation and management being the responsibility of Boyce Hydro, LLC (collectively, "Boyce"). Lee Mueller, a co-member manager of Boyce Hydro, LLC, and Michele Mueller[12] served as EGLE's contacts for purposes of accessing the dam and coordinating operations. Boyce assumed the FERC licenses in 2007.

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subject to any future jurisdiction or licensing by FERC and with allowance for fluctuations of "no more than 0.3 feet above and 0.4 feet below . . . the normal legal lake level" set in the Order. "NGVD 29" refers to National Geodetic Vertical Datum of 1929, ad "NAVD 88" refers to "North American Vertical Datum of 1988." Both are fixed reference points for measuring elevations in the United States. See National Geodetic Survey <https://geodesy.noaa.gov/datums/faq.shtml#WhatVD29VD88> (accessed April 8, 2026). For purposes of this opinion and order, the designations will be used interchangeably.

[12] The reference to "Mueller" throughout the opinion refers to Lee Mueller.

The record demonstrates that defendants were not able to access the property and/or inspect the dam without legal authority from an administrative tribunal or a court, or the permission of Boyce. This was understood not only by EGLE but also by Boyce. For example, attached to a December 20, 2019, e-mail from Mueller to David Kepler, the President and Chairperson of the FLTF, is an Administrative Inspection Warrant authorizing defendants to enter the Edenville Dam property for the purpose of inspecting and collecting "flora and fauna materials," and taking "measurements and photographs of the real property described as any exposed bottomlands owned by Boyce Hydro LLC or its affiliates located in Tobacco and Billings Townships, Gladwin County." In the e-mail, Mueller presents his "impression" that DEQ (EGLE's predecessor agency) "is without legal standing . . . to impose any mandates for water levels in the Wixom Impoundment." After the Edenville Dam failed, on June 3, 2020, and again on August 13, 2020, defendants obtained an Administrative Inspection Warrant ordering Boyce to authorize access to enter the property for the purpose of conducting a compliance inspection, respectively, by June 26, 2020, and September 30, 2020, between the hours respectively specified in the warrants.

Also, on June 15, 2020, EGLE and DNR obtained a Temporary Restraining Order from the United States District Court for the Western District of Michigan requiring Boyce and related persons or entities to employ an engineer to conduct an emergency inspection on the remaining portions of the Edenville Dam and prepare a comprehensive report including steps necessary to mitigate damages. The engineer was to make an immediate report, not later than June 19, 2020, with the full report due by July 24, 2020.

Mueller, in fact, informed EGLE that Boyce exercised operational control. In an e-mail dated February 5, 2020, for example, Mueller informed EGLE that "Boyce Hydro is the operating

company for the [Edenville Dam] for at least the next two years and is therefore the entity to contact regarding any questions about the current conditions at the dam and regarding any requests for access on the part of the Dam Safety personnel employed by the State of Michigan."

The refilling of Wixom Lake to the normal summer lake level in the spring of 2020 occurred at Mueller's instruction. Specifically, on April 9, 2020, when EGLE issued the permit to refill the dam, Mueller informed Kepler that "[t]he operators are going to be very busy managing water levels for probably the next four or five weeks." Two days later, on April 11, 2020, Meuller wrote to Kepler again, informing him that

> Boyce Hydro personnel will commence the water level increase in the Wixom reservoir starting with the first shift on Monday, April 13th. Subject to the available inflow of water from up river, the Edenville dam spillway gates will be operated to allow a maximum water level increase of about six inches per day for about six or seven days. After that Boyce personnel will evaluate the weather projections and estimate whether or not the same rate of fill should be continued or if there is the possibility of a pending storm event that would dictate keeping the reservoir down for a while longer until the danger passes.

Testimony at trial confirmed that this was common practice. Gregory Uhl, the head operator of the Edenville Dam, testified that he was hired by Mueller to manage all four dams on the Tittabawassee and Tobacco Rivers, including managing the lake levels by opening and closing the gates. Uhl took orders from Mueller and, if he would have noticed a problem with the dam, he would have reported it to his supervisors, Boyce's engineer, or Mueller. Uhl testified that no one at EGLE or DNR instructed him on the appropriate lake level. He made the effort to raise the water levels in Wixom Lake in spring 2020 because Mueller told Uhl that arrangements were made with the FLTF to refill Wixom Lake. On the day that the flood occurred, EGLE engineers, Lucas Trumble and Dan DeVaughn, arrived at the Edenville Dam to observe and assist; however, at no time did either of them direct Uhl in the dam's operations.

As explained below, a plan was in place to transfer the dam to the FLTF. In the interim, EGLE treated both the FLTF and Boyce as the owner, according to e-mail correspondence from EGLE engineer, Lucas Trumble, to an IFT member, Ifran Alvi, dated May 5, 2022. Trumble explained that EGLE tried to ensure that both entities were working together when it came to permit applications, decisions related to the dams, etc. In Trumble's words, "[i]t was clear that FLTF was taking the reins and leading the charge toward further analyzing and designing long-term fixes but Boyce was either participating, cc'd, and/or signing off on any documents that came before us, to my understanding."

C. A PLAN WAS IN PLACE TO TRANSFER OWNERSHIP TO THE FLTF

There was a plan to transfer ownership from Boyce to the FLTF at all times relevant to this litigation. The FLTF is a 501(c)(3) organization, exempt from federal income tax under section 501(c)(3) of Title 26 of the United States Code. In August 2019, Midland and Gladwin Counties recognized it as their delegated authority under Part 307 of the NREPA, MCL 324.30701 *et seq.*, for the acquisition, management, repair, and maintenance of the four lakes and the dams retaining these reservoirs.

The FLTF originated in 2011 with the formation of the Sanford Lake Preservation Association (SLPA), a 501(c)(3) organization assembled for the purpose of facilitating restoration of Sanford Lake. SLPA and other lake associations, working with Gladwin County, eventually formed the FLTF through a memorandum of understanding in July 2018. In time, the SLPA changed its charter to include all four lakes and adopted FLTF as its name. Agreements were entered in 2019 providing for the FLTF to purchase Boyce's properties on Tittabawassee and Tobacco Rivers. Signed in December 2019, the purchase agreement required the FLTF to deposit

a first installment in January 2020, after which Boyce would remain the legal owner of the dams continuing operations and retaining revenue from the sale of generated electricity at the dams other than Edenville until a final closing date that was two years away. The FLTF planned to assume responsibility for directing seasonal reservoir levels and regulatory reporting responsibilities to FERC and others. The first installment was delayed to June 2020, and then this purchase agreement was nullified after the Edenville Dam failed on May 19, 2020, and the counties assumed ownership of all four dams via their condemnation authority.

The documents that Boyce and the FLTF entered into with respect to the purchase of the Edenville Dam evidence a plan to raise the water level of Wixom Lake from its winter level to the summer level maintained while under FERC's licensing. A "key component" of Boyce's counteroffer, dated April 9, 2019, included an agreement to immediately increase the level of Wixom Lake, as well as transfer use, occupancy, and control of real property, with title to pass after payment of the purchase price. Boyce agreed to gradually raise Wixom Lake on April 15, 2019, with the goal of having the "normal (FERC-license) pond level restored in six weeks for the duration of the calendar year" in exchange for a monthly payment to cover operating and material expenses.

On April 12, 2019, in an e-mail to Kepler, Mueller stated his intent to "prepare a detailed proposal for [Boyce's] planned implementation of early restoration of 'normal' pond levels for Wixom Reservoir." And, in an April 16, 2019 letter of understanding, Boyce and the FLTF agreed that the FLTF would make monthly payments of $40,000 to "be applied to the purchase price." "[A]s a consequence for this consideration," Boyce would promptly "begin the process to bring up the lake level for Wixom Lake . . . ." That same date, Mueller sent an e-mail to operators, Ron

Heilig and Uhl, stating that he had made arrangements with the FLTF to start refilling Wixom Lake to the normal summer operating level. They were to continue daily inspections and observation of the "entire Edenville Dam embankment on both the upstream and downstream slopes" and check for discharge water in the toe drains.[13] "If any sign of subsidence or instability is observed by any operator," Mueller instructed that Heilig and Uhl be notified and that they notify Mueller.

D. REGULATORY REPORTS AND INFRASTRUCTURE

The Edenville Dam was the subject of numerous inspections by professional engineers and other specialists in dam safety. Following is a brief description of the reports, followed by analysis pertinent to the embankments, predictions of factors that may lead to its failure (i.e., "Probable Failure Modes"), and overall assessments of the dam's condition. None of the engineers in any of the reports determined that the dam was in imminent risk of failure or recommended the lake level be drawn down.

1. Historical Dam Safety Inspections:

The IFT report provides a chronology of early reports that were not separately identified in the record. It states that FERC performed a Dam Safety Inspection (DSI) in September 1986 prior to the November 1986 license application and conducted subsequent inspections in 1987, 1989, 1991, 1993, 1995, 1997, and August 1998 before the license was issued on October 16, 1998.

- Regular inspections occurred after licensing on at least an annual basis.

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[13] A toe is "[t]he point of intersection between the upstream or downstream face of the dam and the natural ground." A toe drain is an "[o]pen jointed tile or perforated pipe located at the toe of the dam used in conjunction with horizontal drainage blankets to collect seepage from the embankment and foundation and conveys the seepage to a location downstream from the dam." Nat'l Performance of Dams Program (NPDP), Stanford Univ, *NPDP Dam Dictionary*, http://npdp.stanford.edu/dam_dictionary/t (accessed April 18, 2026).

- The only inspection report that referred to an indication of wet or previously wet drains was in the 1997 DSI.

- The 2000 FERC DSI noted that some lateral drains were not producing flow, but did not specify which drains, and a special investigation was performed by FERC on May 9, 2003 due to small sinkholes and a minor slough that occurred in the Edenville right embankment immediately adjacent to the right powerhouse wall. A similar condition was noted in the Tobacco left embankment, resulting in a small sinkhole on the mid-slope of the downstream embankment face near the spillway wall. By July 2003, the two areas of sinkhole were reported to be dry. Between 2004 and 2018, the embankments were judged by FERC to be in good condition overall.

2. Consultant Safety Inspection Reports (CSIRs) Prepared as Required by Part 12D of Title 198 of the Code of Federal Regulations (Part 12D)

a. General Information

Part 12D requires licensees to provide FERC with a detailed report by an independent consultant who is a licensed professional engineer, who is not an employee or agent of the licensee and who has at least 10 years of experience and expertise in dam design and construction in dam safety to review prior reports, conduct a physical inspection of the dam, review dam safety programs, and prepare a report.

These reports are known as CSIRs, and they occurred on the Edenville Dam in 1991, 1994, 2000, 2005, 2010, and 2015.

The IFT report identified and summarized the 1991 and 1994 CSIRs in pertinent part as follows:

- The 1991 CSIR noted two areas of seepage, one along the downstream toe of the left embankment near the spillway and the other near the downstream right draining wall of the powerhouse. Seepage was described as "very minor" and clear. A slope stability analysis was performed, and the Independent Consultant (IC) recommended "repairs to the surface erosion areas observed at the embankments section located to the left of the Tobacco spillway structure."

- The 1994 CSIR described the embankments as consisting of "poorly graded sand, based on samples collected in the downstream slope," and as constructed in compacted lifts based on available specifications. Crest survey indicated that the "embankment crest had not settled," and the upstream slope at the left abutment of the Edenville left embankment showed signs of sloughing into the reservoir. The IC stated "[c]onsiderable fluctuation in the amount

of seepage measured at the weirs and horizontal drains were noted, but was judged not to be excessive." The report recommended constructing "sediment traps at each of the toe drains to determine the origin of sands" and the initiation of a "boring program to verify embankment soil strength parameters used in analysis." According to the IFT, it does not appear either of these initiatives occurred.

The 2000 and 2001 CSIRs as well as reports prepared for a Board of Consultants (BOC) at FERC's request were provided in the record. The pertinent information is summarized as follows:

- In the 2000 CSIR, the embankments were described as consisting of "poorly graded sands, placed in compacted layers" based on samples taken from the downstream slope of each embankment, and as constructed in compacted layers according to the construction drawings and specifications.

- A 2001 CSIR prepared for Wolverine Power Corporation (10/16/2001) reports that the left embankment "appeared well maintained and in good condition...."

- In 2005, the then-owner of the Edenville Dam retained a BOC in response to information from FERC that the spillway capacity was insufficient to satisfy FERC's standards, raising a risk of overtopping.

  i. The estimated capacity identified in the report (32,800 cfs) was less than 50% of the identified Inflow Design Flood (73,900 cfs).

- Four meetings of the BOC were held to discuss the safety of the Edenville Dam. This included meetings on December 13-15, 2005; May 23, 2007; February 5, 2009; and on November 16-18, 2009.

- In a 2009 report by a Special BOC following the February 5, 2009 meeting, it was verified that the spillway capacity needed to be increased. The PMF[14] described in this report was approximately 62,000 cfs.

[14] PMF is an abbreviation for "probable maximum flood." Chapter VIII of FERC's Engineering Guidelines for the Evaluation of Hydropower Projects defines probable maximum flood as "the flood that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in the drainage basin under study." FERC, *Engineering Guidelines* <https://www.ferc.gov/sites/default/files/2020-04/chap8.pdf> (accessed

i. According to this report, "[l]owering the existing spillway crests and providing new gates at both the Tobacco and Edenville spillways presents a reasonable method to increase the total spillway capacity."

ii. With respect to embankment stability, the 2009 report states that "[t]he stability of the upstream slope under rapid drawdown still needs to be confirmed[;]" however, the installation of a toe drain provides adequate stability for the downstream slope of the embankment under all loading conditions anticipated in the design."

- In November 16-18, 2009, the fourth meeting of the BOC occurred for the purpose of reviewing findings relative to the meeting in February 2009. A presentation was made explaining the "concept for modification of the project's spillway bays" with a plan to "remodel each of the six spillway bays on both dams, one at a time." This report approved the concept for increasing the spillway capacity and found that the installation of the toe drain improvements had "gone well" and was a "desirable modification to increase confidence in the dam's safety."

b. 2010 and 2015 CSIRs - Probable Failure Mode Analysis (PFMA)

- The 2010 and 2015 CSIRs were included in their entirety in the record. Each summarized a report of 15 Potential Failure Modes (PFM) prepared following an analysis conducted June 13-15, 2005, for purpose of the 2010 CSIR[15] and re-evaluated for purposes of the 2015 CSIR. Plaintiffs' expert, William Sturtevant, testified to a standard practice of reviewing the prior CSIR as background for a new CSIR every 5 years.

April 9, 2026). Part 315 of the NREPA captures a similar concept in its definition of "half probable maximum flood," which reads as follows:

> "Half probable maximum flood" means the largest flood that may reasonably occur over a watershed, and is derived from the combination of hydrologic runoff parameters and the half probable maximum storm that produces the maximum runoff. [MCL 324.31503(7).]

[15] The 2010 CSIR review included a site inspection on May 27 and 28, 2010, which led the IC to make recommendations regarding the conditions found and resulted in a belief that "the recommendations which accompany this report will provide for safe and reliable continued operation of the project." This site visit was carried out by three professional engineers as well as the chief operator for Boyce.

Each PFM (identified below) was designated by a Category I, II, III, or IV, which designates those items of "greatest significance considering need for awareness, potential for occurrence, magnitude of consequences and likelihood of adverse response" (Category I); those judged to be of lesser significance and likelihood (Category II); more information or analyses needed to classify the PFM (Category III); and PFMs that "may be ruled out because the possibility does not exist," the PFM is so remote a possibility as to be "non-credible," or information has come to light "which eliminated the concern that had generated the development of the PFM (Category IV)."[16]

Probable Failure Modes (with Category Designation)

1. The timber piles that provide a seal between the steel sheet piling and the concrete spillway walls deteriorate leading to a rise in the phreatic surface within the embankment. Elevated phreatic surfaces result in a sloughing failure on the downstream slope, loss of embankment material, and the eventual failure of the sheet pile cutoff wall resulting in an uncontrolled release of the reservoir. **Category II

    a. The 2010 CSIR recommended that this be reclassified to a Category IV because the timber sheeting was replaced by "embankment grouting" and "the issue is no longer applicable as a failure mode."

2. The embankment is overtopped during an extreme flood event. This could result in significant erosion of the downstream slope leading to failure of the embankment and an uncontrolled release of the reservoir. **Category I

    a. The 2010 CSIR reported that the licensee "has designed a plan which is under FERC review" which "provides for significant increase in spillway capacity and will resolve the PFM as a concern." It was "recommended" that "review and approval be completed and the project be scheduled for construction." Once complete, this PFM would be reclassified as a Category IV.

    b. The 2015 CSIR determined that the embankment would be overtopped in an event that exceeds approximately 28,500 cfs discharge (including the 2,000 cfs turbine flow).

        i. "This could result in significant erosion of the downstream slope leading to failure of the embankment and an uncontrolled release of the reservoir." However, "[m]ajor

[16] These descriptions of Categories I through IV are taken from page 94 of the IFT Report.

repair work to the spillway" was planned at the time of the 2015 CSIR, which would eliminate the issue as identified in the PFM, "changing the PFM to a Category IV item."

ii. Surveillance required with respect to this PFM was a "monthly walk-through of the project."

3. Failure to operate the spillway gates properly results in overtopping of the embankment. This could result in significant erosion of the downstream slope leading to failure of the embankment and an uncontrolled release of the reservoir. **Category II

a. The 2010 CSIR reports that the "Licensees['] plan for spillway capacity modification includes new remotely operated gates with individual gate operators." And, "[o]nce this project is completed, the issue will be resolved and no longer a concern."

4. Seepage through the embankment enters into a tile drainpipe or seeps along the embankment's foundation resulting in piping and internal erosion. This could lead to a developing pipe or sinkholes connecting to the reservoir. Increased seepage over time could result in a blowout of the embankment and an uncontrolled release of the reservoir. **Category I

a. The 2010 CSIR reported that "[r]everse filter Toe drain installations on the active drains have nearly been completed. When this construction is complete the issue will no longer be a concern." It further recommended "that Tobacco toe drain berm be scheduled for complet[ion] during the ensuing CSIR review period" and once complete, this PFM could be reclassified as a Category IV.

5. An MCE[17] seismic event occurs resulting in liquefaction of the embankment material and an uncontrolled release of the reservoir. A liquefaction analysis was completed as part of the 2010 CSIR. That analysis determined the embankment is stable during the seismic event. **Category III – reclassify to IV

a. The 2010 CSIR reported that a liquefaction analysis was included in the report, and such "information completes action on this issue" because "[t]he liquefaction analysis indicates that the dam is not

[17] The Federal Emergency Management Agency (FEMA) defines MCE in its Federal Guidelines for Dam Safety, as the "Maximum Credible Earthquake" as "the largest earthquake magnitude that could occur along a recognized fault or within a particular seismotectonic province or source area under the current tectonic framework. FEMA, *Federal Guidelines for Dam Safety*, < https://www.ferc.gov/sites/default/files/2020-04/fema-65.pdf> (accessed April 9, 2026).

subject to liquefaction." The 2010 CSIR states that this could be reclassified as a Category IV.

b. According to the 2015 CSIR, "A liquefaction analysis was performed in 2010 for the embankment and determined that the earthen embankment was not subject to liquefaction during earthquakes."

c. The 2015 CSIR recommended this PFM be reclassified to a Category IV because "the earthen embankment is not subject to liquefaction during earthquakes."

6. A sliding or overturning failure of one of the concrete structures results in an uncontrolled release of the reservoir. **Category II

a. The 2010 CSIR reports that a "Sliding Stability Analyses for all structures have been completed" and "[t]he results indicate the structures satisfy the Commission's guide lines so this issue has been resolved." It should be reclassified as Category IV.

b. The 2015 CSIR referred to a Structural Stability Analysis, latest revision reclassify dated 12/20/2010, which showed the "structures are stable against both sliding and overturning." Accordingly, the 2015 CSIR reclassified this PFM from a Category II in the 2010 CSIR to a Category IV.

7. Undermining of the spillway aprons is allowed to develop and eventually results in the formation of a pipe underneath the structure and an uncontrolled release of the reservoir. **Category II

a. The 2010 CSIR recommends that 5-year dive inspections be conducted "to determine the magnitude of any undermining such that undermined areas can be repaired as frequently as they are found."

8. During periods of high flows, tailwater levels increase and eddying currents erode the downstream toe of the embankment near the abutment walls. This could lead to an eventual slope failure and an uncontrolled release of the reservoir. **Category II

a. The 2010 CSIR indicated that "[a]pproval of the Spillway rehabilitation project with the installation of new spillway gates, individual remotely operated hoists will allow the ability to discharge a jet of uniform velocity from the project. This ability will reduce the gyre which creates the potential erosion on the toe of the embankment and riverbanks. Continuing inspection will further

allow protective action. Completion of the toe drain berms connecting to the spillway structure at tobacco will effective rip rap the toe of the slope. Completion of the review process and moving forward with rehabilitation project is recommended."

9. Significant deterioration of the concrete that comprises the spillway ogee rollway or retaining walls leads to a structural failure of the spillway resulting in an uncontrolled release of the reservoir. **Category I

a. According to the 2010 CSIR, "[a]pproval of the Spillway rehabilitation project with the installation of new spillway gates, will provide the concrete rehabilitation necessary to restore the structures to quality long lived structures as required by FERC. Completion of this review process and moving forward with the project is recommended."

10. Clogging of toe drains leads to higher than normal phreatic surface[18] levels within the embankments resulting in failure of the downstream slope and the eventual uncontrolled release of the reservoir. **Category II

a. According to the 2010 CSIR, "Reverse Filter toe drain installation has eliminated this issue from concern. The design of the reverse filter protects the dam from this failure mode. Completion of the Tobacco Toe drain is recommended." And, upon completion, this PFM should be reclassified to Category IV.

11. Significant waves combined with high pool levels cause erosion of the upstream slope. This allows the reservoir to wash up and over the embankment crest, leading to a failure of the embankment and an uncontrolled release of the reservoir. **Category II

a. According to the 2010 CSIR, "[w]ind wave erosion is not a significant issue with this project and the review of the PFM wind condition provides the understanding that wind set down will occur. Significant rip rap exists along the embankment and is inspected every year. Continued inspection and repair when needed is recommended. The existing annual maintenance planning by the Licensee will supply the required oversight for this issue." This PFM should be reclassified as Category IV.

[18] "Phreatic surface" is "[t]he free surface of water seeping at atmospheric pressure through soil or rock. FERC, *Federal Guidelines for Dam Safety, Glossary of Terms*, < https://www.ferc.gov/sites/default/files/2020-04/fema-148.pdf> (accessed April 18, 2026).

12. Failure of one of the spillway gates on either structure results in rapid drawdown of the upstream pool, leading to failure of the upstream slope of the earth embankment and an uncontrolled release of the reservoir. **Category IV

13. Erosion in the floor of the turbine discharge bay could lead to significant undermining of the powerhouse. Over time, a pipe could develop under the powerhouse connecting the upstream reservoir with tailwater. Significant flows through this pipe could result in failure of the powerhouse and an uncontrolled release of the reservoir. **Category III

a. According to the 2010 CSIR, "Erosion in the turbine discharge bay floor is not a credible event given the fact that these machines have a metal draft tube line which transitions into a concrete elbow draft tube. By design, the discharge velocity is reduced to the point where the exit velocity of the draft tube is significantly below the velocity where the discharge can cause erosion. This PFMA should be reclassified as a Category IV."

14. Debris or ice buildup beneath the M-30 Bridge creates a restriction of flow between the drainage basins. This coupled with a significant flood event over one of the basins could result in flows in excess of the spillway capacity, overtopping, and failure of the earth embankment, and an uncontrolled release of the reservoir. **Category IV

15. Reservoir levels reaching higher than historical levels results in increased phreatic surface levels within the earth embankments leading to a slope failure and an uncontrolled release of the reservoir. **Category IV

The 2010 CSIR states that the PFMA Report was determined to "include all failure modes which would be credible for the Project." The IC who prepared the 2010 CSIR stated his belief that "it is safe and reliable for the [Edenville Dam] project to continue operation."

c. <u>Additional Analysis Included in 2010 CSIR</u>

The 2010 CSIR includes analysis of the stability of the embankments and the dam, as follows:

i. The summary of field inspections reported favorably on the dam's condition, as follows:

In general, the IC did not observe any signs of instability or structural fatigue to the project structures. The spillways exhibit significant concrete deterioration and require repair. The Licensee's

program in place to design and obtain approval for the total rehabilitation of the spillway structures will resolve the deteriorated concrete issues observed during this inspection and will also resolve the long standing PMF discharge capacity issues existent at this project.

Overall the embankments are in good condition with good grass growth on them. Continued mowing of the embankment will allow good grass coverage of the slopes and minimize loss of cover and erosion. The Licensee has instituted tighter control of the general public access to the embankments which will minimize loss of grass cover due to public traffic on the embankments.

ii. Included with the 2010 CSIR is a Stability Analysis, dated December 20, 2010, which was prepared by Mill Road Engineering. The results of this analysis are as follows:

Stability Analysis Results	
Power House Structure (existing)	FACTOR OF SAFETY
Normal Water Level	3.08
Normal Water Level with Ice	2.90
Full Pond (PMF)	3.19
Edenville Spillway	
Normal Water Level	2.35
Normal Water Level with Ice	2.22
Full Pond Water Level (PMF)	2.69
Tobacco Spillway	
Normal Water Level	2.56
Normal Water Level with Ice	2.554
Full Pond Water Level	2.549

iii. The 2010 CSIR also includes a Liquefaction Analysis, dated December 29, 2010, prepared for Boyce by Mill Road Engineering.

This analysis "incorporates the requested technique as supplied by FERC in earlier correspondence." Specifically, "[a] boring was taken at the left embankment on December 6, 2010, using the procedures required by FERC and Idriss to obtain undisturbed samples with drilling mud backpressure.... The results of the study indicate that the dam is not subject to liquefaction due to the combination of soil characteristics and the very low energy of an earthquake event for this location."

iv. The 2010 CSIR provides the following analysis upon inspection of the left Edenville embankment which ultimately failed:

Inspection of the left Edenville embankment indicated that the drainage trench water level was above the invert of the clay tile drainage

system installed in the dam. The drainage trench invert should be cleaned such that the free water surface of the drainage trench will be lower than the drain tile inverts so that the flow from each tile can be seen and that any sand sediment being passed by each drain can be identified on inspection.

The 2010 CSIR describes the "crest condition" of the left embankment as "in very good condition with a healthy grass growth." The "upstream slope rip rap was found to be in good condition," and a walk of the "left abutment contact" found this "well maintained" with debris and growth having been removed. "No seepage was seen during the inspection," "[g]rass growth on the lower slope was excellent and the toe of the slope contact was mown for clear viewing." Because "[s]ome of the toe tile draining standing water," therefore, it was "recommended that the drainage trench bottom be lowered if possible to allow the drained water level to be located below the invert of the toe drains."

v. The 2010 CSIR concluded that the Supporting Technical Information Document (STID) was "complete and factual, and contains all relevant available information."

vi. The 2010 CSIR concluded that the "project and its facilities suitable for continued safe and reliable operation" based on a site inspection, review of documents included in the STID, supplemental STID information, new stability analysis, and proposed project improvements.

d. Additional Analysis Included in the 2015 CSIR

The 2015 CSIR contained similar analysis and conclusions regarding the dam's overall condition and the condition of its embankments, etc., as follows:

i. The 2015 CSIR explained that the "Licensee's existing inspection and monitoring program is adequate for the project structures and operation[,]" and recommended that "the Licensee continue its existing inspection and monitoring program."

ii. With respect to the structural stability of the dam, the 2015 CSIR contains the following analysis:

1. In general, there was no observation of "any signs of instability or structural fatigue to the project structures. The spillways exhibit significant concrete deterioration and require repair." The 2015 CSIR found that the "Licensee's proposed rehabilitation project to replace and improve both the Edenville and the Tobacco gates will

effectively address concerns regarding deteriorating concrete for the spillway structures. The new spillways will also allow the Edenville project to safely pass the [PMF], which is the appropriate Inflow Design Flood (IDF)[19] for the Edenville Hydroelectric project."

2. "Overall, both the Edenville and Tobacco embankments are in good condition with good grass cover and adequate upstream riprap[20] protection. Continued mowing of the embankment will allow good grass coverage of the slopes, minimize loss of cover due to runoff erosion and will prevent growth of unwanted trees and brush."

3. "The embankments did not exhibit any slumping, sloughing, sliding, cracking, wet areas, or other unusual conditions. The weighted filter toe drains that have been installed appear to provide adequate stability to the downstream toes of the main embankments. The remaining weighted filter toe drains should be scheduled for construction."

4. A field inspection of the Edenville Dam was performed on August 5-6, 2016, which led the 2015 CSIR to conclude that the "project embankments appeared to be stable and well maintained with no obvious signs of unusual movement."

iii. With respect to the left embankment, the 2015 CSIR states as follows:

1. "The left embankment was found to be in very good condition with a healthy grass growth. Generally, there were no slumps, slides, cracks, or other unusual conditions noted. The upstream slope riprap was in good condition. The left abutment contact was walked and is well maintained. Some oozing seepage was seen along the downstream groin area near an old concrete structure. The function of that structure is unknown. The drainage ditch appeared to be functioning properly with the drain pipes freely

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[19] Chapter 2 of FERC's Engineering Guidelines defines "Inflow Design Flood" as the "flood flow above which the incremental increase in water surface elevation due to failure of a dam or other water impounding structure is no longer considered to present an unacceptable threat to downstream life or property." FERC, *Engineering Guidelines* <https://www.ferc.gov/sites/default/files/2020-04/chap2.pdf> (accessed April 9, 2026).

[20] Riprap is defined as "a foundation or sustaining wall of stones or chunks of concrete thrown together without order (as in deep water)," or "a layer of this or other similar material on an embankment slope to prevent erosion." *Merriam-Webster's Collegiate Dictionary* (11th ed), available at <https://www.merriam-webster.com/dictionary/riprap> (accessed April 9, 2026).

discharging into the collector trench. Edenville Wier No. 1 was also observed to be properly functioning. No sand or fines were seen in the drainage ditch or discharging from the individual drain pipes. The drain pipes appeared to be functioning properly."

2. The 2015 CSIR also refers to an embankment stability analysis performed for the weighted filter toe drain project in 2009. This analysis considered "historical observed well values to determine phreatic levels in embankment." Moreover, the "internal angle of friction and cohesion were taken from soil borings in the STID as well as dry and saturate unit weight for soils" and both appeared to be "appropriate for the soils in this section of the embankment" and results of the analysis "meet the FERC minimum required factor of safety for the conditions listed above." Moreover, the 2015 report recognized that "[t]he drains also act to intercept the phreatic line within the embankment and safely conveys the collected seepage to measurement weirs."

3. The 2015 CSIR also recommended that "[i]n the event that the proposed auxiliary spillway is not constructed, the Licensee should consider adding a weighted filter drain in the section of the west Tobacco embankment where the proposed auxiliary spillway will be located between stations 51+00 and 54+00."

"The Licensee should develop a schedule to add a weighted filter berm to the section of the far west Tobacco embankment located between stations 54+00 and 60+00. The embankment is very wide with an average top width of approximately 55 feet. It should be noted that this area of the embankment is also considered to have a low probability of failure due to the minimal static head of approximately 3 feet at the normal pool elevation."

iv. With respect to analysis of the suitability of the Edenville Dam for reliable and safe operation, the 2015 CSIR found the following:

1. The assumptions, methods, and evaluation in the PFMA analysis and the Supporting Technical information as "appropriate for this structure" and considered them "properly applied" and "appropriate given the current guidelines and the state of dam safety practice."

2. The Edenville Dam "satisfies the FERC guidelines for stability."

3. Section 1.3.1 of the 2015 CSIR states as follows:

Based on site inspection, review of documents included in the STID, supplemental STID information and a new stability analysis as well

as stability analysis for the proposed project improvements, the Independent Consultant finds the project and its facilities suitable for continued safe and reliable operations.

e. Other Reports

1. 2016 CSIR

A Sixth CSIR dated August 31, 2017, is accompanied by a letter from FERC to Mueller. FERC explained that this was received "well behind schedule on March 23, 2016" and that it had not yet received the plan and schedule to address the recommendations therein.

2. 2018 DSI Report

A CUI/CEII Dam Safety Inspection Report contained analysis from a period of 6/27/2017 to 6/26/2018. This was submitted and signed by Peter Chapman, P.E. on August 21, 2018 less than a month before FERC issued its order revoking the license. It contained the following information related to dam safety standards:

- Recognizing that the "Edenville project does not meet Commission engineering dam safety standards and criteria due to inadequate spillway capacity," the report indicates that it likely satisfies Michigan's standards. This report claims that "[c]urrently, the dam can convey approximately 50% of the [PMF]."

- With respect to the left embankment on the Tittabawassee River, it is described as follows:

  The left embankment remains in good condition with a good vegetation cover on the crest and slopes . . .very little seepage observed throughout its existence; however, sheet piling was installed in this embankment at the same time with the other embankments.

  * * *

  There were no signs of major erosion observed along the reservoir. No significant problems were noted with the riprap and vegetation that protects the upstream slope. There are areas in which wave action has reduced the effectiveness of the riprap.

  There is sheet pile acting as river embankment erosion protection along the left downstream side of the spillway. The sheet pile has tilted towards the river. The licensee has and continues to ignore previous instructions to repair the sheet piles.

- The overall conditions of the dam were described as "fair" because of indications that PFM # 8, which comes into play when high tailwater levels cause erosion of the embankments along the spillway abutment wall. At the time of the report, there was apparently a potential indication that this PFM was active or developing.

- There is no indication that this PFM was triggered or related to the static liquefaction that caused the dam's failure.

3. Professional Analyses Issued After FERC Order of Revocation

1. A January 4, 2019 memorandum from Richard D. Purkeypile, P.E., describes a hydraulic study that led him to conclude that the Edenville Dam, as it existed on or around this date, was capable of passing Michigan's ½ PMF standard.

2. Spicer Group prepared an inspection report during a reporting period of June 2019 to March 2020. This report was issued at EGLE's request under Part 315 and is described later in this opinion and order. For purpose of completeness, it states in pertinent part as follows:

- A visual inspection determined the dam to be "in fair to poor condition."

- Spicer acknowledged that FERC revoked the license because of "the Edenville Dam's history of non-compliance with FERC regulations; foremost being inadequate spillway capacity to meet FERC Dam Safety Standards...."

- Spicer acknowledged that there are deficiencies that need to be addressed and found that the dam did not pass the half-PMF standard. This has been previously identified during review of the rating curves by the EGLE Dam Safety Engineers and confirmed by the FLTF engineering team, which has initiated engineering studies and the planning process to address spillway capacity of the dam and bring it into compliance with both state and federal requirement.

E. FERC'S 2017 COMPLIANCE ORDER AND THE 2018 ORDER OF REVOCATION

The September 2018 Order revoking Boyce's license for generation of hydroelectric power reflected the last of several orders notifying Boyce of noncompliance.

Specifically, on June 15, 2017, FERC issued a 52-page Compliance Order (2017 Order). This Order identified numerous areas in which the Edenville Dam was operated in violation of its FERC license and FERC regulations. FERC's "primary concern" was Boyce's "longstanding

failure to address the project's inadequate spillway capacity." FERC estimated the Edenville Dam's existing spillway capacity to be "approximately 50% of the PMF," far below FERC's standard of full PMF for this high hazard dam, but satisfying Michigan's standards. FERC also identified "certain risk reduction measures" that Boyce "was required to implement in stages to increase spillway capacity until the full PMF can be passed. These . . . include the construction of auxiliary spillways on both the east and west sides of the project in proximity to the existing spillways to add additional hydraulic capacity."

According to the 2017 Order, FERC worked with Boyce "for years" to increase the spillway capacity of the Edenville Dam, including multiple meetings on the following dates: December 13-16, 2005; May 22-23, 2007; July 9-11, 2007; March 19-20, 2008; and February 4-5, 2009. FERC granted Boyce several extensions of time to construct the auxiliary spillway(s) in response to Boyce's alleged inability to finance this work. In FERC's words, "[t]hirteen years after acquiring the license for the project, [Boyce] has still not increased spillway capacity leaving the project in danger of a PMF event. [Boyce] has shown a pattern of delay and indifference to the potential consequences of this situation. A situation that must be remedied in order to protect life, limb, and property."

FERC also cited Boyce for a "pattern of noncompliance" that extended to other licensing conditions, including frequently filing incomplete materials for FERC staff review, not exercising due diligence in acquiring required permit(s) from EGLE, carrying out unauthorized construction work and earthmoving activity, failure to comply with FERC directives regarding an adequate public safety plan, failure to construct approved recreational facilities, and restricting public access. FERC ordered Boyce to come into compliance with the license requirements by, among

other things, filing plans, specifications, and a schedule to build auxiliary spillways necessary to pass the 100% PMF standard.

On November 20, 2017, FERC issued an Order to Cease Generation in which FERC found Boyce in violation of the Federal Power Act, Commission regulations, and the license for the Edenville Hydroelectric Project No. 10808. FERC's "primary concern" was Boyce's "longstanding failure to address the project's inadequate spillway capacity." In this Order, FERC explained that "The project's spillway capacity must be remedied. [FERC] staff have worked with [Boyce] for over 13 years to address this problem but to no avail. [Boyce] has similarly been unresponsive in addressing other compliance matters related to dam safety, recreation at the project, and property rights." This Order required Boyce to cease generation at the Edenville Hydroelectric Project by November 27, 2017.

No requirement or recommendation was made to lower the lake level of Wixom Lake, nor did FERC find that the Edenville Dam was in imminent danger of failure.

On January 5, 2018, FERC denied Boyce's request for a permanent stay of the Order Ceasing Generation but granted a temporary stay until March 1, 2018. In short, the Order recognized that Dam Safety Guidelines required projects to be "designed to either withstand overtopping or the loading conditions that would occur during a flood up to the [PMF], or to the point where a failure would no longer constitute a hazard to downstream life and/or property" or, in the alternative, the spillway must be "adequate to prevent the reservoir from rising to an elevation that would endanger the safety of the project works." Boyce's request for a permanent stay was denied because it "cite[d] only economic harm, arguing that ceasing generation would seriously impact its revenue and financial capabilities." FERC authorized only a temporary stay,

because of Boyce's pledge "to work to remediate the dam and . . . to escrow 50% of the project's proceeds to fund the necessary work." "In light of the importance of protecting public safety, Boyce's lengthy, extensive record of noncompliance, and Boyce's failure to show that justice requires a stay," FERC declined to issue a permanent stay. It authorized Boyce to use the powerhouse to pass flows until March 1, 2018, "given the potential safety concerns at the project during extremely cold weather . . . . However, Boyce must still ensure that all gates are adequately de-iced and maintained in an operational condition regardless of temperature, and provide to the Commission, on a weekly basis, photos of the de-iced gates."

On September 10, 2018, FERC issued the order revoking Boyce's license. The reason for revocation, as stated in the order, is "Boyce Hydro Power, LLC's . . . longstanding failure to increase the project's spillway capacity to safely pass flood flows, as well as its failure to comply with its license, the Commission's regulations, and a June 15, 2017 Compliance Order." Similar to the November 20, 2017 Order, the order of revocation cited the licensee's failure to correct noncompliance issues for a period of 14 years. FERC's Dam Safety Guidelines required dams be able to safely handle a flood of up to 100% PMF and the 2018 Revocation Order estimated the dam to "pass about 50 percent of the PMF."

The need to increase spillway capacity at this dam was not a new phenomenon. According to FERC documents, the lack of adequate spillway capacity was discussed with a predecessor owner, Wolverine Power Corporation, in January 1999, which requested additional time to address this concern. On June 23, 2004, when the project license transferred to Boyce through a foreclosure sale, Boyce informed FERC of plans to complete construction on the auxiliary spillway on the Tittabawassee River in 2004 and was also studying whether it needed the same on the

Tobacco River. Deadlines to submit detailed plans and/or complete construction passed without progress for decades. In 2013, Boyce considered surrendering its license to FERC because of a claimed lack of available funds to make the required spillway improvements. This surrender never materialized.

In its September 10, 2018 Order, FERC found that "Boyce . . . has yet to file complete and adequate plans for either auxiliary spillway despite receiving numerous extensions of time to complete certain design phase analyses and to file documents." FERC also reported that "Boyce Hydro claims to have abandoned the work that it had been doing on the designs to expand the Tobacco and Tittabawassee spillways" and refused to provide a copy of the agreement that Boyce reportedly entered with a new engineering firm "to start an entirely new set of designs." And FERC stated that Boyce failed to comply with "numerous requirements of the license related to dam safety, recreation, and other resources" despite "intensive efforts" by FERC over the past 14 years to bring it into compliance.

Ultimately, FERC's revocation order summarized the reasons for revoking the license as follows:

> In sum, Boyce Hydro has, for more than a decade, knowingly and willfully refused to comply with major aspects of its license and the commission's regulatory regime, with the result that public safety has been put at risk and the public has been denied the benefits, particularly project recreation, to which it is entitled. The record demonstrates that there is no reason to believe that Boyce Hydro will come into compliance; rather, the licensee has displayed a history of obfuscation and outright disregard of its obligations. We do not often revoke a license, but the licensee has left us with no other way to vindicate the public interest here. We are mindful of the concerns of the local community, which has suffered the results of Boyce Hydro's malfeasance. We conclude, however, that revoking the license will leave the community and state agencies increased authority to deal with Boyce Hydro's noncompliance with important dam safety requirements that have the potential to affect public safety and perhaps come to an acceptable arrangement as to how the lakes will be operated in the absence of hydropower generation.

Revocation became effective 15 days from the issuance date of the September 10, 2018 Order. Boyce was required to permanently disable the project's generating equipment and provide written notification of this to FERC.

On October 22, 2018, Mueller drafted a letter to a congressman requesting legislative changes that would have allowed the Edenville hydroelectric dam to continue operating with the opportunity to recover "FERC-mandated PMF construction costs" as a provision in their contract with the utility companies. Mueller explained that the Edenville Dam produced electricity continuously prior to coming under FERC jurisdiction in 1998 and under this jurisdiction, "numerous PMF engineering studies were conducted." According to Mueller, it was determined that the PMF event would require a doubling of the existing spillway capacity in 2013, which exceeded Boyce's financial capacity. In the letter, Mueller wrote FERC lost confidence in Boyce's ability to finance the project and therefore revoked the license. Mueller asserted that Boyce's decision was based on a "one in more than five hundred thousand year" event and that it "terminated the license of an otherwise viable hydroelectric dam."

After the dam failed, on June 15, 2020, then-director of EGLE, Liesl Clark, testified to the United States House of Representatives that the Edenville Dam's spillway capacity deficiency alone would have warranted an overall condition assessment of "poor" for the Edenville Dam.

F. EGLE ASSUMES REGULATORY AUTHORITY

The effect of the September 10, 2018 Order, was that regulation of the Edenville Dam transitioned from FERC to EGLE in 15 days. The first step for EGLE and, according to plaintiffs' expert, William Sturtevant, was to obtain records stored by FERC related to this dam.

EGLE promptly began this process. On September 13, 2018, three days after FERC issued the revocation order and more than a week before EGLE assumed regulatory authority, EGLE filed a Critical Energy/Electric Infrastructure Information (CEII) request with FERC, seeking past inspection reports, including the Part 12D reports. It also began its engineering review with the information that EGLE had at the time. Seidel testified that this information was "not a lot" because it was a challenge to obtain the records from FERC.

FERC did not provide the documents for several months. It responded to Trumble in an e-mail on September 28, 2018, stating that it received the request. As of November 8, 2018, EGLE had not received the documents and Trumble e-mailed FERC to "circle back and check the status of this CEII request for information on this date." The following day, on November 9, 2018, Trumble e-mailed individuals at FERC to follow up on this request. In the e-mail, Trumble reports that EGLE "receive[d] a partial copy of the 2015 consultant inspection report from the dam owner" during an October meeting, but this report lacked "details of the hydrologic and hydraulic analyses performed to evaluate spillway capacity of the dam." It also made reference to a "Supplemental Technical Information Document (STID) which should contain the detailed H&H analyses," which EGLE was also requesting from FERC.

EGLE also corresponded with Boyce in an attempt to gain information. On September 23, 2018, Mueller e-mailed Trumble expressing "the sense of urgency that should be applied to the scheduling of [EGLE's] inspection of the Edenville Dam." Mueller stated that FERC's order would "clearly place the Edenville Dam spillways under exponential increase in wear and tear on the already deteriorated concrete rollway slabs by requiring ALL water discharges to be passed through the spillways."

However, it was not until December 27, 2018, that Michele Mueller e-mailed Trumble a link with "the latest CSIRs for all four Boyce dams (not just Edenville)." This e-mail came in response to a November 2, 2018 e-mail following up on the earlier site visit and requesting information. And, on January 7, 2019, Michele Mueller e-mailed Trumble and others at EGLE, attaching Purkeypile's "Technical Memorandum regarding the determination of hydraulic adequacy of the existing Edenville Dam and radial gate spillways." Trumble responded a day later, with a thanks for forwarding the information and "[i]t looks like we also received a copy of the STID in the mail on yesterday, so we will review and respond accordingly."

On January 10, 2019, Trumble reported to Fusco that he had received inspection reports for the four dams, as well as STIDs and "some information from the FERC regarding the Edenville Dam." In sum, more than four months passed before EGLE received the historical information that it requested on the Edenville Dam.

EGLE responded promptly to Mueller's request that EGLE visit the site. On October 4, 2018, Trumble and Jim Pawloski, an EGLE engineer with several decades' experience, visited the Edenville Dam and performed a visual inspection. On the following day, in an e-mail dated October 5, 2018, Trumble described it as a meeting with the dam owner. The scope of the visual inspection was as follows: (1) a survey of the water level led to notice that the water level was down "approximately 4.1 vertical feet from the normal pool elevation," (2) photographs taken during a walk along the entire day and the noting of "some deficiencies" but "no critical structural deficiencies observed that would lead us to think that structural failure of the dam was imminent," and (3) both obtaining "some previous inspection information from the owner" and requesting "additional information from FERC in DC." Trumble reported that once this information was

obtained, EGLE would be able to "piece together the O&M, structural and hydraulic history of the dam and make recommendations for dam safety based on the whole picture."

Pawloski prepared a memorandum, dated October 8, 2018, summarizing findings and observations of the dam during the October 4, 2018 visit, in pertinent part as follows:

> During the inspection, the dam was observed to be in fair structural condition. Its earthen embankments were well maintained, with only a few bare spots, minor erosion, and no visible signs of significant distress (sloughs, slumps, differential settlement, cracking , sinkholes, etc.) All embankment drains appeared to be functioning. The dam's two concrete spillways showed signs of moderate deterioration (spalling, exposed reinforcing steel, minor cracking and efflorescence), but appeared to be stable and functioning normally. All spillway gates appeared to be operational. No flow was discharging through the dam's powerhouse, but the structure and generating equipment appeared to be in fair condition as well. As such, there were no observed deficiencies that would be expected to cause immediate failure of the dam.
>
> On the date of the inspection, the water level in the impoundment (Wixom Lake) was surveyed and observed to be approximately 4.1 feet below its normal pool elevation. Flow was being diverted through four open radial tainter gates, two at the Tittabawassee spillway and two at the Tobacco spillway.

Not only did EGLE gather information from past regulatory reports, but it also worked closely with Spicer Group, Inc. (Spicer) a private engineering consulting firm hired by the FLTF to provide engineering analyses and other services related to the Edenville Dam.

Communication with Spicer began within months of the September 2018 revocation. Specifically, on December 27, 2018, Ronald Hansen, Vice President and Principal Engineer of Spicer, e-mailed Fusco, then-supervisor of EGLE's Dam Safety and Hydrologic Studies and Dam

Safety Unit. The first objective was to obtain a Part 307 Order[21] and generate funds for improvements to the dam.

Accordingly, Hansen explained that the FLTF was "tasked by resolution" of Gladwin and Midland Counties to "prepare a legal lake level study in accordance with Part 307." Among other things, this study recommended establishing the legal lake elevations that match the FERC licenses, "[i]n other words, no changes to lake levels are being proposed." Hansen explained that establishing this legal lake level "will provide security for property owners on the lake as it will enable local government to maintain the lake levels in the event that FERC licenses are revoked or expired," which had already occurred at Wixom Lake. Expediency was "a key issue as the local community would like to have the 307 structure in place so to maintain the water levels in Wixom Lake for next summer."

Spicer was "aware that repairs/maintenance for each of the dams are needed, although it was not clear as of this date whether the additional spillway capacity at the Edenville Dam" was necessary to meet Part 315 requirements.[22] To the contrary, the "current understanding" was that

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[21] "Part 307 Order," as used throughout this opinion and order, refers to the Midland Circuit Court Order entered May 28, 2019, pursuant to MCL 324.30707(5). Essentially, Michigan law authorizes circuit courts to set an order determining the normal lake level of inland lakes located in the county where the circuit court is located upon a petition by a county board or EGLE. Here, Gladwin and Midland Counties agreed by joint resolution that the Sanford Lake Preservation Association (predecessor to the FLTF) be their "delegated authority" for purposes of petitioning the Midland Circuit Court for an order establishing the lake level for all four lakes on which a dam owned by Boyce Hydro was located. The counties' respective resolutions also designated Spicer Group, Inc. as engineer for the project to set a normal lake level and Douglas A. Jackson and Lawrence Wm. Smith, Jr., as each county's respective legal counsel for the same.

[22] As used throughout this opinion and order, "Part 315" refers to Part 315 of the NREPA, MCL 324.1501 to 324.31529. This section of the NREPA is entitled "Dam Safety." It establishes EGLE's jurisdiction over certain dams within the state, and provides procedures, requirements, standards and authority for operation and regulation of them.

"spillway capacity at the Edenville Dam is adequate to meet Part 315 requirements." Preliminary estimates for repairs and maintenance had been obtained, with the understanding that the scope of the repairs "will be existing infrastructure and will be completed in a 2 to 3 year time frame." However, improvements related to additional spillway capacity had not yet been considered. Hansen requested a meeting with EGLE to review this issue, among other things.

EGLE continued to receive reports and analysis from Spicer, Boyce, and the FLTF. For example, on January 4, 2019, Boyce submitted a Technical Memorandum from its dam safety engineer, Richard Dee Purkeypile, P.E. Purkeypile's deposition testimony was offered at trial upon stipulation of the parties. He was a licensed professional engineer with 35 years of experience in dam safety engineering who served as a dam safety engineer for Boyce. The Technical Memorandum submitted to EGLE "summarize[d] the hydraulic analysis of the spillway adequacy of the Edenville Dam as it currently exists." Purkeypile determined that "the dam can currently pass approximately 54% of the PMF with approximately 0.1 feet of freeboard." The maximum reservoir elevation during the 54% of the PMF is at elevation 682 feet. Purkeypile's opinion that the Edenville Dam passed 50% of the PMF was maintained until at least March 26, 2020, in a letter from Purkeypile to Lawrence A. Kogan, the managing principal of the Kogan Law Group, P.C.

Trumble e-mailed Hansen on February 8, 2019, recognizing that EGLE had received all past PMF studies from Boyce, including "some documents pertaining to the existing spillway capacity of the dam." His plan was to "work through these documents to ensure that the DEQ ½ PMF flow estimate for Edenville is using the best available information." Questions from these reports followed. Hansen responded on February 9, 2019, notifying Trumble that the FLTF "has

schedule[d] 6 public information meetings that are upcoming in February" related to the Part 307 proceedings.

In an April 17, 2019 e-mail to Purkeypile and Mueller, Trumble informed them that EGLE would not be able to make a determination of spillway capacity adequacy until it received requested information, and EGLE's "Hydrologic Studies folks" have had a chance to verify ½ PMF flows based on information from past studies recently provided to EGLE. However, the plan and timeframe set forth was acceptable and "the Dam Safety Program would not object to normal operation of the dam until spillway capacity can be confirmed utilizing best available information and most recent analysis. In the meantime, monitoring during high flows, especially during flow events approaching ½ PMF is imperative."

In a September 18, 2019 Technical Memorandum, Spicer informed EGLE that gate tests were performed in July or August 2019, and the result was that five of the six gates could be "opened generally 9-9.5 feet" and that one gate could only be opened 4.5 feet. While use of the existing A-frame system may have enhanced this, this system presented an unacceptable level of risk to the operators and was not in use.

It was not until February 4, 2020, that EGLE informed the FLTF that it "confirmed the rating curve with the FLTF's consultant and concluded definitively that the dam lacked spillway capacity to convey the design flood, ½ PMF." EGLE requested that this revised information be included in the Part 315 report, which was still forthcoming. Spicer informed EGLE that its goal was to submit the Part 315 report by the end of March.

On February 6, 2020 and March 16, 2020, EGLE personnel attended a preapplication meeting with the FLTF and its consultants to discuss repairs, permitting, and the next steps. On

February 7, 2020, Hanson e-mailed Trumble, stating that Spicer's goal was to submit a Part 315 report by the end of March. At the time of this e-mail, Spicer was "working to present current cost estimates and project financing plan at public hearings and county commissioner meetings" and working on "emergency repairs, including concrete for upstream piers and wingwalls and new gate hoists." Spicer was also working to verify that the auxiliary spillway capacity satisfied Michigan's standards and, therefore, from its point of view, "verification from [EGLE] that this [i.e., additional auxiliary spillways] will be a requirement provides clarity on the scope and the capital improvement bond that is requested." The FLTF's desire was to "have new gate hoists installed" by the fall of 2020 because there was a 7-month lead time for delivery. In addition, the FLTF and Spicer were "working on a long term plan that includes repairing and constructing new auxiliary spillway capacity," however, this will take "several years to implement."

On February 10, 2020, Trumble e-mailed Hansen with an explanation of the Part 315 process and EGLE's expectations from Boyce and Spicer. With respect to the Edenville Dam, Trumble stated that the "critical issue at hand is the current lack of spillway capacity." Trumble acknowledged an e-mail from Hansen laying out a "rough schedule for implementation of projects that would increase the spillway capacity of the dam to meet state requirements, with gate hoist upgrades coming in late summer/early fall 2020 and construction of auxiliary spillways to come in the next 2-3 years." In addition, EGLE's site inspection and review of past inspection reports and analysis "did not uncover any structural deficiencies that would put the dam at immediate risk of failure." Accordingly, Trumble instructed that the "forthcoming Part 315 inspection report should identify any existing deficiencies and recommend a timeframe in which those would be addressed." EGLE expected the owner to adhere to such recommendations and implement repairs "before the deficiencies become critical and impact safety of the dam." If the owner is "unable or

unwilling to perform these repairs in a timely manner, [EGLE] would evaluate and consider escalated enforcement for non-compliance with Part 315 requirements."

G. EGLE'S ENFORCEMENT OPTIONS RELATED TO LACK OF SPILLWAY CAPACITY

Part 315 of the NREPA, MCL 324.31501 *et seq.*, describes EGLE's enforcement options, beginning with its jurisdiction over all dams, except those subject to a federal license, "[p]rojects located on boundary waters under the jurisdiction and supervision of the United States army corps of engineers," impoundments licensed pursuant to [MCL 324.11501 *et seq.*], or those dams not subject to a permit under MCL 324.31506(3). MCL 324.31506. Construction, enlargement, repair, alteration, removal, or reconstruction of a failed dam all require a permit from EGLE. MCL 324.31509(1)

"When immediate action is necessary to protect the structural integrity of a dam," EGLE may issue a permit before expiration of a 20-day period mandated under MCL 324.31511 for the purpose of providing time for the filing of a written request for a public hearing. MCL 324.31512(1); MCL 324.31511(1). A permit issued by EGLE "shall require that plans and specifications be approved" before construction begins, and EGLE is statutorily required to "approve or reject complete plans and specifications within 60 days after their receipt." "The permitted activity shall be completed within a specified time not to exceed 2 years after the date of issuance of the permit," however, on "written application" and for "good cause shown," EGLE may extend this time. MCL 324.31515(1).

The standard for spillway capacity under Michigan law is contained in MCL 324.31516. The Edenville Dam is a high hazard potential dam of 40 feet or greater in height and, therefore, Michigan law required that it "be capable of passing the half probable maximum flood" or, in the

alternative, the "half probable maximum flood criterion may be reduced to not less than the 200-year flood, with proper documentation evidencing [that] a failure of a dam under half probable maximum flood conditions will not cause additional flood damage or loss of life." *Id.* Freeboard "shall be considered" in making this determination. MCL 324.31516(2). If a dam cannot satisfy this standard, "an auxiliary spillway must be provided." MCL 324.31516(3).

Michigan law places the onus on the dam owner to submit an inspection report prepared by a licensed professional engineer that evaluates the condition of the dam. MCL 324.31518(1). It must be submitted at least once every three years for a high hazard potential dam. MCL 324.31518(1)(a). If a dam is owned by a local unit of government, that governmental entity may request EGLE conduct a "visual inspection" and "prepare a report." MCL 324.31518(4). If an inspection report discloses the need for a more "detailed investigation or evaluation of certain dam features for the purpose of determining the condition of the dam," EGLE may order "the completion and submission of that detailed investigation or evaluation at the expense of the owner." MCL 324.31518(5). If the owner does not submit an inspection report, EGLE is authorized to "have a report prepared and recover the costs of preparing the report in a civil action commenced in a court of competent jurisdiction." MCL 324.31518(6).

"Where significant damage to the public health, safety, welfare, property, and natural resources or the public trust in those natural resources or damage to persons or property occurs or is anticipated to occur due to the operation of the dam, [EGLE] may order the owner to limit dam operations" by an order that "may include, but [is] not limited to, cold water release, minimum flow releases from dams, impoundment fluctuation restrictions, or requirements for run-of-the-river operation." MCL 324.31519(1). This order is not automatic but, rather, the statute mandates

that EGLE "take into account social, economic, and public trust values." MCL 324.31519(1). The dam owner also may contest this order prior to its finalization by requesting an administrative hearing. MCL 324.31519(3).

EGLE has authority to issue an order requiring immediate repair, draw down, breach or cease operations only "where a dam is in imminent danger of failure or is causing or threatening to cause harm to public health, safety, welfare, property, or the natural resources or the public trust in those natural resources." MCL 324.1521(1). Such an order may "specify maximum drawdown level and discharge rates," among other things, and require necessary sampling, monitoring or other action deemed necessary to adequately protect the public. MCL 324.1521(2). Here, again, the owner must be provided with an opportunity for an administrative hearing within fifteen days of notice that EGLE plans to issue this emergency order. MCL 324.1521(3).

EGLE "may enter in or upon any private or public property anytime where the public safety may be in danger and at all reasonable times, after attempting to contact the owner before entering the site and having shown proper identification, for the purpose of inspecting or investigating conditions relating to the construction, operation, or safety of the dam and for the purpose of determining compliance with the terms, conditions, and requirements of permits, orders, or notices of approval issued under this part and rules promulgated under this part." MCL 324.31527.

EGLE's processes and procedures for ensuring compliance with Part 315 were described as follows in a February 10, 2020 e-mail from Trumble to Hansen:

> Part 315 requires that all regulated dams are maintained in a safe, structurally sound, and hydraulically adequate condition. The purpose of dam safety inspections is for the inspecting engineer to identify any deficiencies with the dam that would either put it in non-compliance with the state dam safety statute and/or otherwise jeopardize the safety of the dam. Typically, the inspecting engineer(s) would also indicate the urgency of

> maintenance/repair activities to address the deficiencies and provide a recommended timeframe for implementation of those remedies. Dam Safety staff would then review the recommendations of the inspection report and either concur with the findings or suggest further evaluation/action be taken to address critical deficiencies....
>
> If there were a condition that endangers a dam, and a remedy could not be implemented in a timely manner through this amicable correspondence between the dam owner and Dam Safety staff, then we would be compelled to elevate our compliance/enforcement actions and issue an order for actions to be taken to alleviate the danger/deficiencies. However, we always do try to go the first route, to the extent possible.

H. PART 307 COURT PROCEEDING

Under Michigan law, inland lake levels are established by a circuit court order, often upon petition from the count(ies) in which the lake is located. MCL 324.30704(2). A hearing date is set and notice is required to be provided through publication in a newspaper and service by first-class mail at least three weeks prior to the hearing to "each person whose name appears upon the latest city or township tax assessment roll as owning land within a tentative special assessment district at the address shown on the roll" as well as the "governing body of each political subdivision of the state in which the lake is located" and the "governing body of each affected political subdivision of the state." MCL 324.30707(1), (2). EGLE must be served with notice at least 21 days prior to the date of the hearing. MCL 324.30707(3). The court is required to consider a number of factors in determining the normal level of the inland lake, including "past lake level records, including the ordinary high-mark and seasonal fluctuations," government surveys and reports, "[f]isheries and wildlife habitat protection and enhancement," "[r]ights of riparians," as well as testimony and evidence offered by all interested parties and other pertinent facts and circumstances. MCL 324.30707(4). By statute, courts are required to "determine the normal level to be established and maintained, shall have continuing jurisdiction, and may provide for departure from the normal level as necessary to accomplish the purposes of this part." MCL 324.30707(5).

A similar process was followed here. The FLTF served as the "delegated authority" for Midland and Gladwin Counties for purposes of petitioning the Midland Circuit Court to perform the duties required under Part 307. MCL 324.30701(e). A hearing was held on May 3, 2019, at which several individuals spoke including at least one who testified that his attorney submitted a partial objection on his behalf, but he supported the petition to the extent it sought to settle lake levels at or near those set by FERC. Spicer submitted an engineering report in support of the petition, and Hansen offered testimony as an expert in the field of civil engineering and surveying. The lake levels proposed, which the Midland Circuit Court accepted, were identical with those set by the FERC license. Six informational meetings were held prior to this hearing by the FLTF and over 2,000 persons attended. Part of the petition to the court was for the authorization of a special assessment levied on property owners of 8,516 parcels in 2 counties and 11 townships. Approximately 6,555 of these properties were on the lakefront, and 1,961 were backlots serviced by the lake.

In connection with this hearing, in April 2019, Spicer prepared a "Four Lakes Level Study" for the FLTF, the Gladwin County Board of Commissioners, and the Midland County Board of Commissioners. This 300-page report represented that "[s]hortly after the revocation of the license, the dam owner drained Wixom Lake by approximately 8 feet, presumably due to the revocation of the FERC license." Boyce and the FLTF had an "agreement that the water level will be restored for the summer of 2019, with the understanding that MDEQ will permit this provided that a normal legal lake level is established and repairs to the Edenville Dam are implemented by 2024." "The primary objectives of Midland and Gladwin Counties submitting the petition to the Circuit Court are to maintain levels into the future, ensure all dams become and remain compliant with state safety standards, acquire rights to operate and maintain the dams and lake bottoms, and

establish local authority that will be responsible to manage the dams." The written submissions publicly stated and recognized the need to increase spillway capacity.

EGLE did not object to the requested relief but requested language requiring any permits required by law be obtained prior to commencement of work to achieve or maintain the legal lake level and, also, that FERC's requirements for Sanford, Smallwood, and Secord Dams, as well as the revoked FERC license for the Edenville Dam be incorporated into the circuit court order.

On May 28, 2019, Midland Circuit Court entered an order akin to that requested by the FLTF's petition. With respect to Wixom Lake, the order set the normal summer lake level at 675.8 NGVD 29 (or 675.2 NAVD 88) and normal winter level for Wixom Lake at 672.8 NGVD 29 (or 672.2 NGVD 88) but "subject to the jurisdiction of FERC and license issued by FERC for the Edenville Dam for Wixom Lake, if any, and if so, until such time that the license is revoked or terminated." This order authorized the lake levels to fluctuate at predetermined levels and required compliance with the FERC license that was specifically revoked as well as any permits required by law and set boundaries for a Four Lakes Special Assessment District.

I. DEFENDANTS' REGULATION EFFORTS TO PROTECT NATURAL RESOURCES

Unrelated to the FERC license revocation, defendants had concerns about natural resource damages because of Boyce's operations of the Edenville Dam. Shortly after FERC revoked the license in 2018, Boyce drew down Wixom Lake without applying for a permit because, as Mueller explained in an e-mail to Kepler, Boyce planned to lay off "approximately 50 percent of its staff as a result of the loss of the Edenville Dam Electrical generation revenue." Mueller offered to discuss "potential options for financial assistance" that were necessary to "support normal water levels."

Around this same time, DNR alerted EGLE to staff's observation of "stranded and/or dead mussels in Wixom Lake" during a site visit that occurred the week before the October 19-22, 2018 e-mail chain. The Part 307 court proceedings had not yet occurred, and EGLE indicated at that time that it had "no authority to require a private owner to operate their dam in a manner that they feel increases their liability" or to raise the lake level absent a court order.

In the fall of 2019, Boyce, with the support of the FLTF, applied for a permit from EGLE to draw down Wixom Lake to a run-of-the-river level, as required by Michigan law, i.e., MCL 324.30102(d). According to the application, the drawdown would not be permanent but, rather, the plan was to refill Wixom Lake by March 1, 2020. The application was denied, and Boyce conducted the drawdown anyway.

Jessica Mistak, the Habitat and Regulatory Affairs Section Manager for the DNR Fisheries Division, testified at plaintiffs' request at trial. She described the mission of DNR as protecting Michigan's natural resources, and the role of her team in particular was to protect aquatic species and their habitat. DNR has no authority to issue a permit under Part 301, although it might provide comments and recommendations to address concerns regarding natural resources and habitats. Boyce's application was filed with EGLE. Neither Mistak nor her colleagues are engineers, specialists in dam safety, or hydraulic capacity.

In 2018, Mistak e-mailed Scott Hanshue, the senior fisheries biologist, who was also "delegated lead on mussel committee efforts." Mistak testified that she and Hanshue discussed whether it was practical to assess natural resource damages from the Wixom drawdown, and his opinion was that it was "practical and even prudent." This e-mail was forwarded to Todd Grishchke, the DNR fisheries division assistant chief and Mistak's immediate supervisor.

Grishchke agreed that DNR should conduct a mussel survey. Mistak coordinated with Hanshue, Joe Rathun and Amanda Chambers "to come up with a survey plan and get a commitment from a crew of 8 led by Joe to begin surveying last Friday." Rathun and Chambers are malacologists, i.e., "mussel experts." Mistak testified that it was not unusual to employ persons with this expertise, and the question of whether to proceed with a mussel survey would typically be decided within DNR.

Damage calculations for the mussels exceeded $300,000,000 because of, in Mistak's opinion, the "large number of mussel species affected." Approximately 1,200 dead mussels were found in a sample area; which, extrapolated over the course of Wixom Lake, calculated to approximately seven million dead mussels or $323,730,669 in damages, plus civil fines. A December 3, 2018 e-mail and memorandum from Mistak to James Dexter and Todd Grishchke at DNR detailed the damages as follows:

> **Wixom Lake Mussel Kill Valuation**
>
> A. **Cost of investigation, administration, and monitoring is estimated at $15,163**
>
> B. **From field investigation, estimate of total number of adult/mature mussels killed are:**
> 216,468 Tobacco Arm Timed Search (surface) + 896,060 Tobacco Arm Quadrat (subsurface)/mean percentage surviving to maturity or 15% = 7,416,853
>
> 49,134 Tittabawassee Arm Timed Search (surface)/mean percentage surviving to maturity or 15% = 327,560
>
> C. **Using Southwick and Loftus (2017) Appendix F, the estimated cost to produce taggable-size mussels is**
> $69,505,106 Tobacco Arm Timed Search (surface) + $243,255,975 Tobacco Arm Quadrat (subsurface) = **$312,761,081**

$10,954,425 Tittabawassee Arm Timed Search (surface); no subsurface mussels = **$10,954,425**

D. Total restitution amount (A+C) = $323,730,669

Mistak testified that "mussels are the most imperiled group of animals in North America, and of Michigan's 44 species, half were—are rare, threatened." Moreover, the 8-foot drawdown affected a very large area within Wixom Lake, which Mistak described as "a very narrow impound, with two arms, and mussels live in that shallow water habitat" that was dewatered by the drawdown. Mistak testified that it was not unusual for DNR to seek to recover natural resource damages from a person or entity who causes a "blatant and willful destruction" of natural resources.

Kyle Kruger, a fisheries biologist who retired from DNR in 2021-2022 after more than 20 years' experience, testified at a deposition on April 9, 2025, and portions of his testimony were read into the record on stipulation of the parties. Kruger agreed with Mistak that it was a "very consistent" practice at DNR to have a mussel survey or a stranded fish survey, and then evaluate the effects of a drawdown every time a dam was drawn down lower than the winter water level. He testified that "every single time a dam was drawn down lower than the winter level . . . wildlife surveys had to be conducted." This was "very consistent" in Kruger's experience for all the dams that he monitored for compliance with FERC requirements.

Kruger was familiar with the Edenville Dam and environmental concerns. Approximately one-third of his professional time was dedicated to monitoring 75 hydroelectric dam projects under FERC licenses to evaluate the owner's compliance in the areas of environmental and recreational use. He regularly corresponded with FERC regarding these dams, including the Edenville Dam, and estimated that he contacted FERC to report an issue of noncompliance by Boyce, perhaps 75

times—more than any other hydro project—because "[t]hey were the most non-compliant." Kruger was asked if he recalled any particular correspondence. His response was that "Most of [the correspondence] had to deal with saying there was a recreation site available and open to the public and they were not."

Kruger testified that "[f]or most of the time that Boyce had the projects they were lacking spillway capacity." However, his background was in fisheries biology. As his supervisor, Mistak testified that any information that Kruger had regarding dam safety would have come from information that FERC provided to him or his colleagues.

In 2013, Boyce was considering surrendering the FERC license, and Kruger notified EGLE of this. His e-mail expressed doubts as to whether "there's gamesmanship afloat here or this is Boyce giving up." Kruger stated that Boyce "had multiple strategies to address the issues and they came at it in many different directions and they were in constant state of change so it was always hard to figure out what they really meant." Recognizing that the FERC license would result in the dam reverting to EGLE's regulatory authority under Part 315 of the NREPA, Kruger hypothesized that FERC would work with defendants to "ensure the dam complies with Michigan law before the surrender is approved." Boyce did not surrender its license in 2013.

In an April 23, 2019 e-mail, Kruger raised a concern that the lake level set to match FERC's requirements did not account for the fact that the dam would not be used to generate power. Moreover, the order was pre-acquisition for the FLTF and if the purchase fails, defendants would be faced with a situation similar to a dam in Cheboygan County, in which the county was the enforcing entity but did not own the dam and the assessment was not in place.

Both Mistak and Kruger testified specifically and unequivocally that safety takes priority over environmental concerns. Brian Rudolph testified to this as well.

On December 11, 2019, after denial of a permit authorizing a winter drawdown in 2019, EGLE noted a 4.3-foot drop in total water elevation of Wixom Lake since October, and EGLE observed "stranded (dead) mussels." On December 12, 2019, EGLE issued an Enforcement Notice to Boyce. In the notice, EGLE explained that it denied the permit to draw Wixom Lake down because "there are feasible and prudent alternatives to managing ice on the impoundment that have a less significant impact on the State's natural resources." EGLE provided Boyce with the opportunity to comply with the legal lake levels in the Part 307 Order by "immediately ceasing active drawdown of Wixom Lake" and if Boyce did not do this, "EGLE may take escalated enforcement action against Boyce Hydro and others who are collaborating with Boyce on the drawdown."

On January 21, 2020, Assistant Attorney General Nathan Gambill, defendants' counsel, informed Boyce's counsel, Lawrence Kogan, that the state planned to move forward with a civil action over the Wixom Lake drawdown in 2018 and in 2019. Gambill informed Kogan that the state intends to seek "natural resource damage, an order to restore the mussel populations and otherwise repair the environmental harms the drawdowns have caused, and an injunction against other future unauthorized drawdowns." Settlement negotiations occurred on March 13, 2020, in which the state sought $5.5 million in restitution and a civil fine of $200,000. The FLTF offered to pay $1 million on behalf of Boyce. Given the lack of success, on May 1, 2020, defendants filed a complaint in Ingham Circuit Court to recover natural resource damages for the harm caused by the unauthorized, yet temporary, winter 2018 and 2019 drawdowns. Boyce had already raised the

lake to its normal summer level; therefore, EGLE and DNR solely sought an order for damages because of the temporary drawdowns, and requiring Boyce to obtain permits before performing any drastic temporary drawdowns in the future.

J. WINTER DRAWDOWN IN 2019

Following the drawdown in 2018, Boyce returned Wixom Lake to its 2018/2019 normal summer pool level without action by any defendant or other state actor. In 2019, Boyce and the FLTF filed a Joint Permit Application that requested authority to draw down Wixom Lake by eight feet, beginning November 4, 2019. The application offered to open the spillway gates to allow the lake to reduce by 6 inches per day over a period of 16-20 days. The requested drawdown was not intended to be permanent; rather, the permit application stated that the "refill would begin in early spring when water temperatures are near 39 degrees in accordance with the Part 307 order." The application stated that the FLTF planned to assume responsibility for operating the Edenville Dam in January 2020, but in the meantime, it recommended the Wixom Lake be drawn down because it "believes this is the safest and most practical method to operate the dam during the winter months, until needed repairs can be installed."

The FLTF issued a press release on September 20, 2019, announcing an application for a drawdown permit because "multiple engineers agree that a winter drawdown of 8 feet, conducted several weeks before ice starts to form on the lake, is the most practical and safest course of action for this upcoming winter." The press release stated that the early drawdown would not interfere with summer lake levels but, rather, "Wixom Lake will return to the normal summer level by the time the surface water temperature reaches 39 degrees Fahrenheit in spring 2020, in accordance with the Part 307 order."

The plan to restore the lake level was reiterated in communication between the FLTF, Boyce, and EGLE, including an October 15, 2019 e-mail from Kepler to Mueller representing the plan to bring the lake level back in the spring, and an October 22, 2019 e-mail from Hansen to Trumble, in response to a request for information to allow EGLE to determine whether a feasible and prudent alternative to the proposed 8-foot drawdown exists. Hansen explained that the Edenville Dam lacked a heating component, adequate hoist system, safe winter working conditions, and well-maintained spillways.

DNR reviewed this permit at the request of EGLE and provided its response in a letter dated October 2, 2019, to Brian Rudolph of EGLE. DNR was "not convinced" that the alternatives to drawing down the lake were "fully vetted, as there may be deicing options that could be implemented relatively quickly that could reduce the drawdown extent." DNR was concerned that the timing of the proposed drawdown was "well outside the recommended season for mussel relocation" and may "negatively impact herptiles that have already burrowed in the shoreline and littoral zone areas to overwinter." DNR did not advise EGLE to refuse the permit authorizing the drawdown but stated that if EGLE's Dam Safety Program "determines that the full 8-ft drawdown is the only viable option to preserve the integrity of the dam structures, there are several conditions that should be met" to minimize the negative impact on aquatic organisms. Such conditions included completing the drawdown by mid-October or, if a drawdown after this date is deemed necessary, it should "start no later than the first week of November" and occur at a rate of 0.5 feet per day. DNR found the mussel relocation plan presented in the permit to be insufficient as well and provided recommendations regarding this.

Mistak testified that the state was not trying to leverage the mussel damage to get some action out of Boyce. She explained that DNR has a "general concern about all drawdowns," however, DNR only opposes a drawdown when it has the "ability to cause natural resources impact" and there are efforts that can be taken to mitigate this impact. While DNR was "not completely convinced" that the drawdown was necessary for safety concerns, EGLE and DNR sought additional information to find out if there was a feasible and prudent alternative, which Mistak described as not an unusual practice.

EGLE ultimately determined that neither Spicer nor the FLTF "adequately demonstrated that a feasible alternative to drawdown does not exist." In an October 27, 2019 e-mail to Rudolph, Trumble acknowledged that conditions were not ideal and the Edenville Dam was not "currently equipped with measures that slow/prevent the formation of ice along the downstream face of the spillway gates, gate seals, and concrete spillway faces and walls." However, the submission from the FLTF and Boyce left "open questions" as to how quickly the ice forms and how often Boyce's staff was implementing deicing measures to keep the gates and spillways free of significant ice buildup. Discussions with other dam owners presented a "consensus" that the ice buildup occurred only over several days when manual deicing measures were not implemented, and the daily use of heated pressure washers as well as other built-in measures, can adequately address the problem. "None of these dam owners indicated that full opening of the Tainter gates and drawdown of the impoundments is necessary to maintain the safety of the dams. Furthermore, and by their own admission below, Edenville Dam staff were not de-icing the gates on a daily basis as is likely needed during a cold period." Therefore, it was Trumble's opinion that "there is a feasible and prudent alternative to the drawdown that has not been adequately explored by the applicant or their

consultant teams." The winter permit was denied, and an e-mail notification of the denial was sent to Rudolph on November 25, 2019. Boyce conducted the drawdown anyway.

K. APPROVED PERMIT APPLICATIONS IN 2020

In 2020, EGLE approved two permit applications regarding the Edenville Dam. Specifically, EGLE issued permit WRP020435 v.1 to Boyce, authorizing it to "conduct spillway repairs on the Edenville Dam" on February 14, 2020. The permit authorized rehabilitation of "deteriorated concrete and steel reinforcement at the spillway piers and pier noses of both the Tittabawassee and Tobacco spillways of the Edenville Dam, Dam ID NO. 549." No drawdown or refilling of the Wixom Lake impoundment or wetland impacts were authorized by this permit.

On February 27, 2020, Boyce and the FLTF applied for a second permit authorizing Boyce to raise the summer water level of Wixom Lake "back to the summer normal pool elevation of 675.2 (NAVD88)." In the permit application, the FLTF agreed to work with a contractor to complete "high priority concrete repair items" on the Edenville Dam by April 10, 2020, through funds that had already "been allocated from the State of Michigan" and begin the refilling process on that date. An emergency plan to reduce safety concerns had been identified and was currently being executed. The FLTF represented that it would report to EGLE on a monthly basis regarding its status.

On April 9, 2020, EGLE issued permit WRP021788 v.1, to Boyce at its request to refill Wixom Lake to the normal summer pool elevation as required by the Part 307 Orders. Rudolph signed the permit, authorizing the lake level to return to the normal summer level. He was not an engineer or a specialist in dam safety but, rather, consulted with Trumble with respect to it. No one at EGLE informed him that allowing the water levels to return to this height would be a danger

to residents or businesses downstream of the dam. While he knew of ongoing discussions regarding the deficient spillway capacity, Rudolph was never told that authorizing the raising of the water level was unsafe. Rudolph testified that he relied on EGLE's Dam Safety Unit, in which there was a normal practice and expectation, that they would tell him of any concerns.

In an April 8, 2020 e-mail, the FLTF advised Mueller to sign the permit on behalf of Boyce because the language that Mueller questioned was standard and raising the water level was consistent with the counties' and lake communities' interests. EGLE knew at this time that the dam's spillway capacity was not sufficient to pass Michigan's ½ PMF standard; however, plans were underway to obtain funds to repair the dam, and the record is void of any engineering report, expert opinion, or evidence indicating that this water level was unsafe or the dam was likely to fail before such repairs could occur. The record does not support a finding that EGLE abused its authority in granting this permit.

L. RAINFALL EVENT BEGINNING ON MAY 17, 2020 TO MAY 19, 2020 AND HISTORIC LAKE LEVELS

The Edenville Dam failed after a rainfall event beginning on May 17, 2020, and continuing through May 19, 2020. An Incident Report filed with FERC quoted a National Weather Service report on May 17, 2020, in pertinent part as follows:

> [w]idespread rainfall totals of 5-8 inches were observed in [the Tri County] region, which simply overwhelmed the Tittabawassee River watershed.... With increasing elevation heading north into northern lower Michigan, the heaviest rain totals (7-8 inches in Gladwin and Arenac counties), resulted in excess runoff flowing in a general north to south direction towards the Edenville and Sanford dams.

The IFT report described this rainfall as "significant, but not extreme." The total 42-hour rainfall for 11 subbasins upstream of Sanford Dam ranged from 3.57 to 5.36 inches with a weighted

average of 4.29 inches across the entire watershed. This was only a fraction of the probable maximum precipitation for the Edenville basin, which was 17.2 inches over 72 hours, with about 85 percent of the precipitation (14.4 inches) occurring during the middle 24 hours of the event. The following table from the IFT report displays the rainfall reported at all four dams owned by Boyce in 2020:

Table 3-1	**Daily Rainfall Totals, in inches, at the Four Boyce Hydro Dams May 1, 2020 to May 19, 2020**			
Date	**Sanford**	**Edenville**	**Smallwood**	**Secord**
5/1	0	0	.03	0
5/2	0	0	.03	.03
5/3	0	0	0	0
5/4	0	0	0	0
5/5	0	0	0	0
5/6	0	0	0	0
5/7	0	0	0	0
5/8	0	0	0	0
5/9	0	0	0	0
5/10	0	0	0	0
5/11	.03	0	0	.06
5/12	0	0	0	0
5/13	0	0	0	0
5/14	.27	.17	.14	.13
5/15	.73	.75	.40	.83
5/16	0	0	0	0
5/17	.2	.46	0	0
5/18	2.79	3.08	3.69	5.67
5/19	.16	.32	0	.23

This rainfall did not correlate with rising lake levels. According to the IFT report, "[t]he spatial and temporal characteristics of the May 2020 rainfall combined with the watershed conditions produced an unusually high runoff." The heaviest rainfall occurred in the "northern and eastern areas of the watershed" and almost all was "concentrated in an 18-hour period with an intensity of about 0.22 inches/hour." The result was a "concentration of the volume of the runoff

in a relatively short time period," and a "relatively high percentage of the total rainfall (about 35 percent)" converted into runoff, resulting in a record inflow into Wixom Lake.

As a result, the 25-50 year rainfall event produced a 100-to-200 year flood. The IFT report explained that on May 19, 2020, the lake level rose to 5.5 feet above its normal level after a rainfall of 4.30 inches over 2 days. The following table, contained in the IFT report, demonstrates seven selected rainfall events in which the lake level exceeded its normal level of elevation, 675.8. There were 5 years when the lake rose 1.4 feet or more above this elevation, i.e., in 1928, 1929, 1945, 2014, and May 2020 when the Edenville Dam failed.

Maximum Lake Level		**Depth Above Normal Lake Level**	**Rainfall/ Duration**
Date	**Elevation**		
June 26, 1928	677.2	+1.4 feet	2.92 inches/ 2 days
April 6, 1929	678.3	+2.5 feet	4.46 inches/ 2 days
June 2, 1945	677.2	+1.4 feet	3.59 inches/ 2 days
September 12, 1986	676.3	+0.5 feet	6.83 inches/ 2 days
April 13, 2014	677.2	+1.4 feet	4.53 inches/ 2 days
June 23, 2017	676.2	+0.4 feet	5.04 inches/ 2 days
May 19, 2020	681.3	+5.5 feet	4.30 inches/ 2 days

John France, a member of the IFT, testified about this table at trial. France testified that the chart was compiled "from records that we could assemble of annual high lake levels at Wixom Lake from original construction through to the—the event that occurred in 2020." The table demonstrated that a less-than-usual amount of rainfall could generate a really high lake level. This information would factor into risk analysis of the safety of the dam and its lake levels because "records like this would—would suggest that the likelihood of [the reservoir exceeding the crest elevations of the embankment] is lower, because we've had a hundred years of experience of the dam operating, without—up until 2020, without a reservoir level that is getting very close at all to the crest of the dam."

The IFT report attributed this to "[a]ntecedent moisture conditions (e.g., elevated groundwater levels and ground saturation) in the undeveloped and wetland areas of the watershed, along with areas of partially frozen ground at or near the ground surface [which] likely resulted in reduced infiltration and percolation into the ground and led to a higher percentage of the rainfall being converted to runoff, which flowed into the river and lake systems." Moreover, the highest precipitation numbers were received in the Tittabawassee River Basin, rather than the Tobacco River Basin.

M. PART 315 REPORT

Spicer submitted its Part 315 inspection report to EGLE in early June 2020, approximately two weeks after the Edenville Dam failed. Acknowledging that due diligence associated with the pending purchase revealed that "significant repairs are needed," Spicer pointed to a Michigan Economic Development Corporation grant that enabled the FLTF to start the repair process. Phase II of this process included dam and spillway improvements scheduled for 2024.

On visual inspection, Spicer determined that the dam was "in fair to poor condition" and that deficiencies needed to be corrected because the dam "does not provide adequate capacity to pass the ½ Probable Maximum Flood (PMF) event sufficiently to meet EGLE dam safety requirements." While "the FLTF has initiated engineering studies and the planning process to address increasing spillway capacity of the dam and bring it into compliance," the FLTF must first "secure ownership of the dam to implement this plan." The FLTF had a purchase agreement with Boyce and was "preparing to make the first payment at which time the bottomlands associated with the impoundment [would] be transferred to FLTF, the properties associated with the dam structure [would] be put into an escrow account, and FLTF [would] contract with Boyce to operate

the dam until 2022, at which time FLTF [would] take over complete ownership and operations." This report described the earthen embankments and the crest of the dam and further stated, "[a]n embankment stability analysis is recommended."

N. EXPERT WITNESSES

The primary evidence presented to the Court on the subject of causation came through the IFT report, which is discussed above; plaintiffs' experts, Dr. David Williams and Dr. W. Allen Marr and defendants' experts, James France, Dr. Scott Olson, and Lucas Trumble.

1. DR. DAVID WILLIAMS, PH.D., P.E., P.H., CFM, CPESC, F.ASCE, BC.WRE

The parties stipulated to admission of Dr. Williams' December 5, 2024, expert report and his February 20, 2025 rebuttal report.

Dr. Williams testified as a certified professional hydrologist retained by plaintiffs to offer an opinion of how high the water level of Wixom Lake would have been expected to rise on May 19, 2020, if the dam had been operating at run-of-the-river level. Williams was qualified as an expert in both hydrology (i.e., the study of whether rain falling in a watershed will ultimately end up in a river) and hydraulics (i.e., the study of how deep, wide, and fast rainwater will act once it is in the river). With respect to the Edenville Dam failure, Williams was retained to explain what happened, how the lake behaved, how the outflow was determined, and to promulgate a hydrograph.

Williams utilized a software program known as the Watershed Management System (WMS) to identify the magnitude of the watershed or drainage area surrounding Wixom Lake and breaking this into nine subbasins delineated based on the location of the Lake Lancer Dams, Secord

Dam, Smallwood Dam, Beaverton Dam, Chappel Dam, and the Edenville Dam.[23] Williams testified that the subbasins each appeared to have a similar average slope, land use, and soil type. The land located within each basin shares similar characteristics. According to Williams, WMS is commonly utilized by most hydrologic engineers for this purpose.

The data in Williams' model utilized rainfall data from Rappolt, discussed above, as well as information from the IFT report, placing this information in HEC-HMS[24] model, and calculated the runoff curve number (RCN) which is an indication of how much rainfall runoffs will reach the river. The lower the RCN, the more rain is absorbed into the ground; while the higher the number, the more rain runs off and into a river. This analysis led Williams to conclude that if the Wixom Lake reservoir had begun at a run-of-the-river elevation (667.8 feet), the water's maximum elevation level would have reached 679.9 feet, and the dam would not have failed.

Williams' team calibrated the model with data from the United States Geological Service (USGS) gages. The USGS places gages at locations throughout the United States that provide real-time measurements. According to Williams, the USGS gages are the "most dependable measures of water flowing in a river system." One of these streamflow gages is located on the South Branch of the Tobacco River near Beaverton, Michigan, and recorded a peak flow of 2,530

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[23] Figure 2-1, on page 9, of the IFT report includes a map identifying dam locations in central Michigan. The Lake Lancer Dam is on the Sugar River which eventually feeds into the Secord Dam, which feeds into the Smallwood Dam and the Tittabawassee River. The Beaverton Dam is upstream from the Edenville Dam and Wixom Lake and feeds into the Tobacco River. The Chappel Dam is upstream from the Beaverton Dam. It creates Wiggins Lake in Gladwin County, which feeds into the Cedar River leading into the Beaverton Dam.

[24] HEC stands for Hydrologic Engineering Center. The HEC-HMS is the Hydrologic Engineering Center Hydrologic Modeling System. The HEC-RAS is the Hydrologic Engineering River Analysis System.

cfs during the Edenville Dam break. A second gage, also on the Tobacco River but at Glidden Road, recorded a peak discharge of 8,480 cfs during the Edenville Dam break. A downstream gage, near or below the Sanford Dam, recorded a peak flow of 51,800 cfs after the dam's failure.

The IFT report reached a different conclusion. Its analysis differed in that its model delineated a watershed with 11 subbasins, all of which "experienced a period of about 18 hours of high-intensity rainfall at about 0.22 inches/hour during the middle of the storm." And the IFT calibrated its model against "the measured and estimated lake levels during the May 2020 event" and documented spillway operations and gate openings were used to simulate spillway outflows. The IFT estimated peak inflow into Wixom Lake as 24,500 cfs; and while the USGS data is reliable, no gage existed on the Tittabawassee River, located more northeast of the Edenville Dam. According to the IFT, "[a]reas in the northeastern part of the watershed experienced greater rainfall totals with a return period approaching a 100-year event."

2. DR. W. ALLEN MARR, P.E., PH.D., NAE

Williams' data and model were utilized by Dr. W. Allen Marr, who drafted an expert report dated December 5, 2024, on plaintiffs' behalf. Marr is a geotechnical engineer by education with more than 50 years' experience in the public and private sector.

His report began with an executive summary. Marr recognized that the Edenville Dam failed at 5:46 p.m. on May 19, 2020. He agreed with the IFT that the mechanism of its failure was static liquefaction, a process whereby "saturated, loose sand suddenly switches from a drained state to an undrained state which causes it to lose shear strength and become unstable. The loss of shear strength triggered a global instability failure." Marr concluded that the failure occurred on the left embankment because this was the "location of the steepest downstream slope,"

"[c]ontractive soils existed in the downstream portion of the dam," a "base drain was missing," and a "layer of native sand existed beneath the dam that may have been continuous across the bottom of the dam." A number of steps could have been taken to avoid this failure, including placing a fill overlay on the downstream slope, keeping the lake level below 680.3 feet, replacement of the sandy silt in the upstream portion of the dam, and installing additional drainage.

Marr explained that soils are "broadly categorized" as either contractive or dilative in terms of how they respond to stress. Loose sands and fills are contractive and "tend to decrease in volume when subjected to shear stress." Saturated dilative soils, like dense sands and gravel, tend to increase in volume and increase in soil strength. Static liquefaction occurs when "contractive soils, under saturated conditions, experience a change that causes a sudden increase in pore water pressure due to their tendency to reduce in volume during shearing. If the pore water pressure rises to the point where it equals or exceeds the effective stress within the soil, the material can no longer sustain its load and it collapses." Marr's report explains that "[i]n embankment dams, zones of loose, contractive soil pose critical vulnerabilities." Static liquefaction can be triggered by several things, including changes in water level, external loading (i.e., flood or heavy rainfall), and seepage or internal erosion that reduces soil density.

The Edenville Dam was comprised of embankments composed in varying proportions of sand, silt, and clay. It retained water from both the Tittabawassee and Tobacco Rivers. The left side of the embankment, where the failure occurred, was the steepest downstream slope and Marr believes its soil was largely contractive due to construction photographs showing that the embankments were constructed using tip carts with little compaction and, also, from soil borings,

observations of the breach remains, and geologic details. Because of the nature of the failure, many of the borings were retrieved downstream, sometimes some distance from the original slope.

Marr used Williams' hydrology analysis and rainfall measurements to determine a hypothetical maximum lake level at Wixom Lake if the reservoir began at run-of-river. Marr's geological analysis of the dam failure calculated initial pore pressure in the embankment based on a calculated steady state water flow analysis, assigning "shear strength and permeability parameters to different types of materials using laboratory test data performed by the IFT and the American Society of Civil Engineers (ASCE), and correlations with SPT values from borings." The model was built using FLAC3D software, based on the assumption that materials were initially in a drained state, but became saturated over time as the reservoir level rose, and then used this model to simulate rising water levels in small increments during the flood event.

The first model utilized was the Base Case Calibrated Model, which is used to "model as closely as possible the conditions and observations of the failure." Specifically, the initial conditions with a lake level at 675.4 feet, little to no seepage at the toe of the slope for the initial conditions, water levels initially 10 feet below ground surface, and failure at 5:50 p.m. on May 19 when the lake level reached 681.2 feet. Marr ran this model through several scenarios, including a missing drain that is replaced, or a stabilizing berm was replaced. In these scenarios, the dam did not fail when the water level reached a maximum level of 681.3 feet. Finally, the model assumed the reservoir began at the "Run off the River" scenario. "In the steady state maximum lake level analysis, the model was stable with deformations less than 1.5 inches with a maximum lake level of 680.3 feet."

3. DR. SCOTT OLSON, PH.D., P.E.

The models and testimony of Williams and Marr were the subject of testimony and records presented on behalf of the defense. This included Dr. Scott Olson, a professor at the University of Illinois, who holds a Ph.D. in civil engineering and whose research has focused on static liquefaction, among other things. Olson testified that while Marr's expert report and analysis "certainly could be correct," he was uncomfortable with the level of certainty assigned to how the embankments would perform based on small changes in the water level. Static liquefaction is now "fairly widely recognized as a potential failure mechanism" for even earthen embankment dams; however, the "internal mechanics" for this failure are not well understood and remain an area of "active research" in Olson's lab as well as others across the globe. Prior to the Edenville Dam failure, neither the industry nor state regulators were looking at static liquefaction as a potential issue. Shortly after the Oroville Dam failure in 2017, "there was a huge focus in the dam safety industry and among dam regulators to focus on overtopping events, to focus on spillways of these types of structures" because the most common mechanism for this is overtopping or failures of the spillway. The Edenville Dam did not exhibit overtopping.

Moreover, based on his analysis, either individually or in the supervising of students of "over 75 of these types" of failures involving static liquefaction, Olson has found a "significant amount of uncertainty associated with the key variables that have to go into any of these sorts of stability or stress deformation analyses." This was historically true for dams for which there was significantly more information available to engineers evaluating the dam. In fact, in his work and the back analyses that he performed, Olson testified that it was not unusual for results to vary by 30 percent from his best estimate, "sometimes more" with dam failures in which there was much more information than that present with the Edenville Dam. Olson testified that, with respect to

the Edenville Dam, there was "very limited in situ data . . .very limited knowledge of the specifics of the stratigraphy. We have very limited knowledge of the specific elevation of the water surface at the time of the failure." While the IFT studied the soils gathered after the fact, "there's a good stretch of several hundred feet, or at least a hundred feet on either side of where the breach initiated, where the liquefaction occurred." This makes knowing the stratigraphy with confidence to be highly uncertain in his opinion, and the stratigraphy affects "every aspect of the modeling, from the stress analysis to the seepage analysis to the stability to the deformation." Also, in his experience, engineers "generally cannot use laboratory tests to accurately and precisely define the shear strength of a sandy soil," nor is it uncommon for the permeability factor to vary by 100, i.e., instead of water passing through a soil at 0.1 centimeters per second, it could very easily pass through at a rate of 0.001 centimeters per second.

As a result, Olson testified that "another engineer could come up with a value that would be different than that value, given the same inputs" and, in fact, he had seen this in other dam failures that he investigated through back analyses, even more well documented and understood than that presented by the Edenville Dam. He also testified the geotechnical analysis in the IFT report was both reasonable and defensible.

Both Marr and Olson testified about different examples of highly imminent engineers analyzing similar data sets, studying the issues related to them, and then making estimates or forming opinions about what would happen. Olson's descriptions are above. Marr spoke of a field experiment he was able to conduct in the 1970s related to a 40-foot-high embankment that was constructed on an interstate highway that was to be abandoned for environmental reasons. Marr indicated the main question was how much fill could be put on the 40-foot embankment before

there would be a stability failure. He testified the answers from eight imminent engineers ranged from 6 feet to 30 feet, and the actual failure was at 18 feet.

4. JOHN FRANCE, P.E., D.GE, D.WRE

France also testified about the uncertainties associated with static liquefaction. Its definition is settled, i.e., "liquefaction is the phenomenon by which these loose sands suddenly lose strength from a transition from drain conditions, on drain conditions." France described it as a "complicated geotechnical phenomena, but the fundamental thing is in one second [soils] have a certain strength that's operative, and very shortly after that, the strength drops dramatically, and it drops below the—the stresses that are being applied to the soil by the gravity force of the embankment and the water pressing on the embankment on the upstream slope. And that combination of forces, those forces are suddenly much, much higher than the strength . . ."

France also testified, the geotechnical engineering community is "still really struggling with . . . what triggers these static liquefaction failures." In the case of the Edenville Dam, the questions are "compounded by we don't know the exact geometry of the failure, 'cause all that material was washed away." The stratigraphy and zoning within the dam were just unknown because the left embankment had "some different materials" and there appeared to be "some at least crude or rudimentary zoning" with "maybe" more permeable materials on the downstream side, less permeable clay materials on the upstream, and more clay in the right and center areas of the embankment. However, it was impossible to know exactly where these materials were found before the embankment collapsed as borings were taken "some distance from the actual failure area" and exhibited differences among each other.

5. LUCAS TRUMBLE, P.E.

Trumble also prepared an expert report, dated December 7, 2022, and testified as an expert witness on defendants' behalf. His expert report, first, analyzed a 2021 Technical Memorandum that estimated the storage volume for the Wixom Lake impoundment created by the Edenville Dam and which was prepared by Jun Wang, P.E., and Sepideh Sarachi, P.E. of TRC Companies. In Trumble's expert opinion, this memorandum "confirms only one thing: that there is a difference in available storage volume resulting from lowering Wixom Lake by approximately 7 feet, when compared to normal operating level for the summer." In his opinion, this memorandum, "provides no analysis or conclusion as to whether lowering of Wixom Lake would have had any significant impact on the likelihood of dam failure during the May 2020 flood event."

Trumble also reviewed the IFT report in its entirety and, after noting several conclusions and findings of the IFT, he provided the following summary:

> The IFT's final report, includes both the requisite data and analyses to conclude the causes of the failure of the Edenville Dam and explore hypothetical scenarios for the May 2020 flood related to additional spillway capacity, different operations of the dam, and pre-lowering of Wixom Lake ahead of the flood. The IFT report confirms that pre-lowering of Wixom Lake would have had such an insignificant impact on peak reservoir elevation and duration that it likely would not have prevented failure. I concur with these findings of the IFT report.

Trumble also testified in response to plaintiffs' experts' conclusions. With respect to Williams, his primary concern was with Williams' measurements as the USGS data upstream from the dam were from two locations on the Tobacco River, not the Tittabawassee. Williams used the Tobacco River data to calibrate the model for the Tittabawassee side, which was a concern for Trumble because the Tittabawassee historically produces more flow than the Tobacco River. The IFT's use of data from the Smallwood and Secord Dams to calibrate its models, and its use of the

gages from the Beaverton Dam and River on the Tobacco River was "preferable" in Trumble's perspective.

6. WILLLIAM STURTEVANT, P.E.

In addition to the expert witnesses' testimony on causation, plaintiffs retained William Sturtevant to evaluate EGLE's Dam Safety Unit's response to gaining control over a hydropower unit that eventually failed due to hydraulic inefficiencies. Sturtevant is a professional engineer licensed in Colorado, Wisconsin, and Michigan. Currently serving as the Chief Dam Safety Engineer for Colorado Springs Utilities, Sturtevant worked in Wisconsin serving as the Dam Safety Engineer for the Wisconsin Department of Natural Resources from 1986 to 2008.

Sturtevant testified to a standard practice in state dam safety regulation to require a dam owner to hire an engineering consultant to perform engineering studies and analysis for the state dam regulator's review. Sturtevant testified that state dam regulators must balance dam safety with protecting the environment; however, this balancing act is "more weighted towards the public safety aspect," in that the regulator must consider the hazards posed to residents downstream and alert fisheries and scientists of plans to alter the dam to ensure public safety. It was also "prudent" to consider the effects on the local community, including social and economic impacts; however, the "paramount" or "first and foremost" concern was public safety. With respect to the Edenville Dam, Sturtevant understood that the Edenville Dam's primary purpose was both hydroelectricity generation and recreational use.

Sturtevant testified to a familiarity with FERC-required reports. He explained that a "Part 12D" report and CSIRs are the same thing, i.e., a very detailed mandated inspection by FERC that occurred every five years until recently. Sturtevant testified that the FERC record was

"instrumental" and actually a "huge advantage" to EGLE's ability to regulate the dam. As Sturtevant explained:

> There's a lot of background that's required to go into those inspection reports, those CSIRs, and it's a really good document to refer to, because you get the history of the dam, you get what failure modes that the experts were working on that inspection came up with and moved forward to investigation, how they were going to try and remedy or reduce that hazard, and then how they moved forward with that process. And also gives you really good background on how the dam was constructed, which is critical to performing the inspection and coming up with your solutions and your analysis, what studies had been done in the past, what the conclusions of those studies were, and how they relate to the current situation with the dam.

FERC-regulated dams had an "abundance of inspections to review," which was "not always the case on the state level." Sturtevant also recognized that FERC's decision to revoke Boyce's license was rare and, indeed, should have "shot up a red flag" as to the dam's condition.

Sturtevant's review of the record led him to a number of observations. First, the construction techniques utilized when the dam was built in the 1920s vary differently from today. Today, differing sediment materials are placed in layers of six inches to one foot, depending on the availability of construction equipment to achieve even compaction to that depth, and nuclear density testing equipment can be used to measure the density of the compaction. At the time the Edenville Dam was constructed, "[t]hey just brought the material and dumped and compacted very little, from the documents I read."

In Sturtevant's opinion, spillways and the components are "still the most critical components" inside the dam. FERC's reference to the "[d]esign flood elevation" relates to spillway capacity and the flood elevation that a dam is capable of safely holding and not overtopping. "Free Board" refers to the "extra room between the highest elevation that the water's predicted to reach during the inflow design flood for the design flood, and the very top of the dam."

This provides a "factor of safety before the dam overtops." "Probable maximum flood" is simply a "really big flood event."

In terms of spillway capacity, Sturtevant did not dispute Trumble's calculations of ½ PMF or Trumble's qualifications, or the process of developing a plan to address this through work with Spicer. Sturtevant testified that the PMF calculation estimates in the CSIRs were not inherently inflated or deflated because the license revocation left Boyce unable to run the turbine. The turbine may have been relevant in allowing some additional water through the dam; however, there is a "certain point" where the turbine would be shut down for fear of damage during a significant flood event.

In Sturtevant's opinion, spillway capacity is "really that black and white." The question becomes what needs to be done in order to make the dam safer. He would expect a state regulator to do "exactly what [EGLE] had planned to do," require the owner and its engineer to do a thorough inspection of the dam and present a plan for increasing spillway capacity and improving dam safety within an appropriate timeframe. In this case, the four-to-five year completion timeframe was not unusual, and it was appropriate for EGLE as a state regulator to work with the owner to "get to a positive end." This, in fact, is part of the dam safety engineer's responsibility. However, "[i]n the meantime, you don't raise the water level to an unsafe elevation, you draw down as far as you can get it and you hold it there." During direct examination, Sturtevant agreed in response to a question from plaintiffs' counsel that, "very early on in the process," the dam was "unsafe, hydraulically inadequate, and structurally unsound." He did not point to any CSIR, engineer inspection report, or FERC requirement recognizing this.

However, in his opinion, the lack of adequate spillway capacity alone should have been sufficient notice because holding a dam at a level other than "run-of-the-river" takes away "a bunch of storage" and renders the regulator unable to "control even smaller, intermediate floods prior to seeing, in this case, a half PMF." The result is that the "dam's either going to be unstable and fail or overtop, one or the other."

IV. FINDINGS OF FACT

The extensive factual and legal background discussed earlier leads the Court to make the following specific findings of fact:

Finding of Fact No. 1: The Edenville Dam was constructed in the 1920s.

Finding of Fact No. 2: The normal summer lake level for Wixom Lake was set at 675.8 NGVD 29 (or 675.2 NAVD 88) for more than 20 years prior to the dam's failure because this was a requirement during all times that the dam was licensed by FERC. Records pre-dating the FERC license indicate the maximum yearly lake levels were generally slightly higher than this level since at least 1945.

Finding of Fact No. 3: At no time between the late 1920s and May 19, 2020, was there ever a time when maintaining the normal lake level of El. 675.8 created a failure of the dam or an overtopping event.

Finding of Fact No. 4: The Edenville Dam is a high hazard potential dam as defined by Michigan law. This designation means the dam is located within an area where failure may cause serious damage to certain types of property, significant environmental degradation, or the potential loss of life. This classification does not indicate whether the dam is structurally sound.

Finding of Fact No. 5: The Edenville Dam was regulated by FERC from 1998 until September 25, 2018, fifteen days after FERC's September 10, 2018 Order Revoking License.

Finding of Fact No. 6: At all times FERC regulated the Edenville Dam, FERC was aware the dam did not have adequate spillway capacity to pass the federal requirement of 100% of PMF.

Finding of Fact No. 7: FERC had authority to order Boyce to lower the water level while the Edenville Dam was licensed by FERC.

Finding of Fact No. 8: At no time while the Edenville Dam was regulated by FERC did FERC ever order the waterway and reservoir leading to and controlled by the Edenville Dam lowered to a run-of-the-river level.

Finding of Fact No. 9: FERC, when it revoked its license for the Edenville Dam, did not require or recommend the water be lowered to run-of-the river.

Finding of Fact No. 10: Upon the FERC license revocation, the state of Michigan received regulatory oversight responsibilities of the Edenville Dam on September 25, 2018.

Finding of Fact No. 11: At all times relevant to this case, the Edenville Dam was owned by Boyce Hydro Power, LLC. Prior to revocation of the FERC license, Boyce Hydro Power, LLC held the FERC license and had contract(s) with Consumers Power for the production of hydroelectric power generation at the Edenville Dam.

Finding of Fact No. 12: At all times relevant to this case, Boyce Hydro LLC had operational control and ownership of the Edenville Dam.

Finding of Fact No. 13: At all times relevant to this case, no state entity, including either defendant exercised ownership of or operational control of the Edenville Dam.

Finding of Fact No. 14: The initiative to maintain Wixom Lake at the normal summer lake level was not initiated by EGLE or DNR.

Finding of Fact No. 15: Multiple inspections and analyses were conducted of the Edenville Dam during its lifespan and none forewarned EGLE or DNR that the normal water levels set by the FERC license were unsafe, presented an imminent risk of harm, or were likely to result in the natural and direct damage to plaintiffs' property.

Finding of Fact No. 16: FERC had the authority to order Boyce to lower the water levels of Wixom Lake before revoking the license. It did not order Boyce to lower the water levels of the Edenville Dam at any point during the processes that led to revocation of the license, nor did it inform EGLE or DNR or Boyce that the water levels ordered when the FERC license was in place were unsafe.

Finding of Fact No. 17: EGLE acted promptly after FERC issued its order of revocation, and its evaluations, inspections, and analyses do not exhibit an abuse of authority.

Finding of Fact No. 18: Regarding whether or not the Edenville Dam could pass ½ PMF after FERC revoked its license, the Court makes the following findings:

a. When the dam first came under EGLE regulatory authority, there were multiple assessments that indicated the dam could pass ½ PMF. These included indications from FERC, Boyce Hydro, and Boyce Hydro's retained engineers.

b. On January 4, 2019, Richard Dee Purkeypile, a licensed professional engineer with 35 years' experience in dam safety who was retained by Boyce to provide engineering services with respect to the Edenville Dam, offered his professional opinion that the estimated spillway capacity of the Edenville Dam satisfied the ½ PMF requirement.

c. On September 18, 2019, Ted Champange of the Spicer Group sent EGLE a memo which stated "The FLTF does not believe that the Edenville Dam can be operated to meet the EGLE dam safety requirement to pass ½ PMF without certain repairs and improvements." The memo concluded with a 5-point plan to address this issue.

d. From September 2019 until February 2020, EGLE and Spicer continued to analyze data related to whether the Edenville Dam could pass ½ PMF.

e. On January 31, 2020, Lucas Trumble of EGLE sent Ted Champange of Spicer an e-mail that states Trumble does not believe the Edenville Dam can pass ½ of PMF.

f. On March 26, 2020, Purkeypile, sent a letter to Boyce's legal counsel stating that the "Edenville project currently passes 50% of the PMF and would therefore be considered to be hydraulically adequate" under Michigan's standards.

Given the facts delineated in (a) through (f) above, the Court finds that EGLE did not abuse its governmental authority by not requiring the dam be lowered to run-of-the-river during the period necessary to raise funds, develop plans, and construct improvements necessary to address the dam's failure to satisfy ½ PMF.

Finding of Fact No. 19: EGLE had no authority to take over operations at the Edenville Dam absent evidence that "significant damage to the public health, safety, welfare, property, and natural resources or the public trust in those natural resources, or damage to persons or property occurs or is anticipated to occur due to the operation of a dam." MCL 324.31519(1). And, even if EGLE had made this finding, before issuing an order requiring changes in the dam operations, EGLE was required to "take into account social, economic, and public trust values" and to provide the owner "an opportunity for a hearing pursuant to the administrative procedures act of 1969." MCL 324.31519(3)

Finding of Fact No. 20: Unless there was an "imminent danger of failure . . . causing or threatening to cause harm to public health, safety, welfare, property, or the natural resources or the public trust in those natural resources," EGLE had no

authority to issue an emergency order requiring immediate "repair, draw down, breach or cease operation of a dam." MCL 324.31521(1).

Finding of Fact No. 21: Edenville Dam failed in the context of a flooding event that was historically unprecedented in the lifespan of the dam. The water level rose to approximately 5.5 feet above the normal summer level, which was twice as high as the last highest peak flow ever recorded—in 1929—in which the pool level rose 2.5 feet.

Finding of Fact No. 22: The Edenville Dam failed due to static liquefaction in the left embankment. Static liquefaction is a process whereby saturated, loose soil switches from a drained state to an undrained state which causes it to lose shear strength and the soil becomes unstable. As of the date that the Edenville Dam failed and, even today, geotechnical engineers, who are respected in their fields, disagree as to the specific trigger(s) for static liquefaction at a given dam.

Finding of Fact No. 23: The remnants of the Edenville Dam after its failure and the lack of accurate drawings for the dam's left embankment presented uncertainty in terms of the type of soil and its stratification on the left embankment at the location of the failure.

Finding of Fact No. 24: At the time the Edenville Dam failed, plans were in place to transfer ownership of the Edenville Dam to the FLTF. The FLTF retained a reputable engineering firm with appropriate licensure, who was working with EGLE's Dam Safety Unit to identify and prioritize repairs to the dam; to develop design plans, specifications, and a schedule for these repairs; and to identify capable contractors who could carry this out. The FLTF was also coordinating efforts with Boyce, the local community, and state agencies to secure funding for these repairs. Based on testimony at trial and the record presented therein, the Court finds these actions and their anticipated time periods for completion to be consistent with industry norms.

Finding of Fact No. 25: Michigan law requires dam owners to submit inspection reports prepared by a licensed professional engineer that evaluate the condition of the dam at least once every three years for high hazard potential dams like the Edenville Dam.

Finding of Fact No. 26: EGLE's policies and procedures were consistent with Michigan law, requiring a dam owner to hire a professional engineer who would prepare a detailed inspection report regarding the dam's ability to evidence compliance with Michigan law and, then, not advancing enforcement options if the owner follows through on the recommendations in such report. EGLE followed its policies and procedures here, and the Court finds this did not constitute an abuse of authority.

Finding of Fact No. 27: The level at which Wixom Lake was set in the spring of 2020 was consistent with the May 28, 2018 Order from the Midland Circuit Court

following public informational meetings and a court proceeding as required by Michigan law.

Finding of Fact No. 28: Related to the Part 307 lake level court proceedings, notice was provided to in excess of 8,000 property owners, public meetings were attended by over 2,000 individuals, a website was established to communicate information, and published notices in local newspapers were made. The court hearings themselves were conducted in a public courthouse, and due to the overflow crowds in the assigned judge's courtroom, the hearings were broadcast in other overflow areas in the public courthouse.

Finding of Fact No. 29: Defendants did not withhold information or seek to conceal information related to the condition of the Edenville Dam.

Finding of Fact No. 30: The enforcement actions that EGLE and DNR took in response to the natural resource damages caused by the unauthorized lake level drawdowns by Boyce Hydro in 2018 and 2019 did not constitute an abuse of authority.

Finding of Fact No. 31: The Court finds, based on numerous witnesses' testimony at trial and a review of the record, that neither defendant prioritized environmental concerns or natural resource damages over the public health, safety, and welfare.

Finding of Fact No. 32: Specifically, as it relates to defendants' witnesses who were defendants' current or former employees, the Court personally observed many of them testify in open court to the fact that safety of persons and property took priority over environmental concerns. Their testimony was emphatic and unequivocal. Several witnesses physically moved forward in their chair and were visibly animated communicating this testimony forcefully. Based on the content and manner of their testimony and lack of any explicit contradiction in the record before it, the Court found this testimony highly credible and persuasive.

Finding of Fact No. 33: The 8-foot drawdown that Boyce conducted in the winter of 2019, after EGLE denied the permit authorizing this, was done out of a concern for operating the dam in the winter months with potentially icy conditions, not out of concern that the water levels themselves were unsafe. Boyce and the FLTF intended to raise the water level to the normal summer level the following spring.

Finding of Fact No. 34: EGLE did not abuse its authority in denying the 2019 permit to allow a winter drawdown of Wixom Lake by eight feet.

Finding of Fact No. 35: EGLE's denial of the 2019 permit to draw down Wixom Lake by eight feet during the winter months was not a direct cause of the Edenville Dam's failure in May 2020.

Finding of Fact No. 36: EGLE did not abuse its authority in approving the joint permit applications in 2020, including approval of a permit to return Wixom Lake to the normal summer level set by the Part 307 Order.

Finding of Fact No. 37: The record, as a whole, supports the IFT's findings that "[t]he May 2020 failure of the Edenville Dam was a result of interactions of numerous physical and human factors, beginning with the design and construction of the project in the 1920s and continuing throughout the life of the project until the failure." It also supports the IFT's finding that the dam's "failure cannot reasonably be attributed to any one individual, group, or organization."

V. ANALYSIS

Having reviewed the record and considered testimony at trial, the Court finds that defendants' actions with respect to the Edenville Dam from the date the FERC license was revoked to the date that the Edenville Dam failed do not satisfy the elements of an inverse-condemnation claim. Plaintiffs' claim is, essentially, that the issuance of the permit in 2020 was a "substantial cause of the decline of [their] property's value" and that by issuing this permit, defendants "abused [their] powers in affirmative actions directly aimed at the property." *Mays*, 506 Mich at 174, quoting *Blue Harvest, Inc*, 288 Mich App at 277. No party, nor this Court, disputes for purposes of the liability phase of this litigation, that the Edenville Dam's failure was a substantial cause of the decline in plaintiffs' property values. However, as explained below, the record does not support a finding that defendants' actions with respect to the dam satisfy the elements of an inverse-condemnation claim as a matter of law.

A. NEITHER DEFENDANTS' ACTIONS WERE A SUBSTANTIAL CAUSE OF THE RAISING OF THE LAKE LEVEL.

Even if *raising the water level* of Wixom Lake was a substantial cause of the Edenville Dam's failure, the record as a whole refutes a finding that defendants' actions were a *substantial* cause of this.

1. DEFENDANTS DID NOT CONTROL THE DAM OPERATIONS

First, the record does not establish by a preponderance of the evidence that either defendant exercised operational control over this dam or otherwise controlled the water level of Wixom Lake. The Edenville Dam was private property, accessed by defendants only by permission of Mueller, on behalf of Boyce as the owner, or by warrant or order from an administrative or judicial tribunal. On at least three occasions, defendants obtained an administrative warrant or court order authorizing them to enter the property, and the record reflects a common understanding by Mueller, EGLE, and the FLTF, as well as Boyce gate operators, that official permission was necessary. As explained above, EGLE obtained Mueller's permission to come on site after FERC revoked the license in September 2018. In a December 20, 2019 e-mail to Kepler, Mueller forwarded a warrant issued by an administrative law judge and described his impression that EGLE was without authority to mandate a water level absent a Part 307 Order. In February 2020, Mueller informed EGLE that Boyce was the operating company for the dam and that requests for access to the property should come through him. And, indeed, Uhl testified that he received instructions as to operating the dam from Mueller or Boyce engineers, not EGLE personnel.

On at least two occasions, Boyce lowered the water levels in the reservoir by as much as eight feet without permission from EGLE; and in 2019, this occurred even after EGLE denied an application for a permit authorizing this drawdown. Finally, the FLTF negotiated with Boyce to secure an agreement to purchase the dam and sought Mueller's signature on the permit to return the lake to its summer level in 2020. The record refutes a finding that either defendant exercised operational control of the Edenville Dam.

2. DEFENDANTS' ENFORCEMENT ACTION REGARDING NATURAL RESOURCE DAMAGES WAS NEITHER AN ABUSE OF GOVERNMENTAL AUTHORITY NOR A SUBSTANTIAL CAUSE OF THE RAISING OF THE WATER LEVEL

In making its finding of a lack of operational control, the Court gave considerable attention to defendants' enforcement actions due to the mussel damages and the significant monetary damages sought by defendants in that context, i.e., in excess of $300 million. However, the record does not support a finding that this constituted an abuse of governmental authority. Mistak and Kruger testified that it was consistent practice for the DNR to evaluate the natural resource impact of unauthorized drawdowns, and that the calculation of damages was arrived at using a sampling method accepted in the industry. The Court found their testimony credible and without evidentiary contradiction based on the record before it.

Moreover, plaintiffs presented no evidence that defendants' enforcement action had a direct causal effect on the 2020 application for a permit to return the lake to the summer level. No one from Boyce testified to this. To the contrary, Boyce and the FLTF communicated their intent to return the lake to the normal summer level even in the 2019 application for a permit that would have authorized a winter drawdown.

The FLTF and Spicer advocated for an order from the Midland Circuit Court setting the lake level at a level above that requested for the winter drawdown, which level had been authorized by FERC for years prior. By the time defendants filed their complaint, the lake had been returned to its normal summer level.

In hindsight, defendants' actions here could be argued to be overreaching or misguided. Numerous experts testified that a modest investment in adding support or drainage in the left embankment may have averted its breach, but the record does not support a finding that this

governmental action influenced Boyce's failure to make this investment, or its decision to return the water level to the summer level or its failure to build an auxiliary spillway. The record as a whole does not support a finding that this constituted an abuse of governmental authority or was a substantial cause of the rising of the water level of Wixom Lake prior to the Edenville Dam's failure. Nor does the evidence support a conclusion that the state defendants chose environmental concerns over safety to persons and property.

3. THE ISSUANCE OF THE PERMIT IN 2020 IS NOT SUFFICIENT FOR AN INVERSE-CONDEMNATION CLAIM AS A MATTER OF LAW.

The issuance of the permit to return the water level to the normal summer level in 2020 is not sufficient to form the basis for an inverse-condemnation claim as a matter of law. Defendants argued, and this Court agrees, that a permit is authorization, not an order, and defendants had no forewarning that authorizing a water level consistent with the summer level under the FERC license and the level that had been in place for close to 100 years would harm plaintiffs' property.

As a legal matter, the Court of Appeals' analysis in *Ankersen*, 148 Mich App 524, is instructive. In *Ankersen,* the Water Resources Commission of the DNR issued a liquid industrial waste hauling license to a private corporation that constructed an incinerator on property over which it held a 5-year lease. *Id.* at 534. A DNR supervisor was aware of hazardous waste accumulating on the property but took no action and, in fact, renewed the license despite repeated violations of the conditions of the license. *Id.* at 534-535. Eventually, the site became a hazardous waste site that cost the state nearly $700,000 to remedy. *Id.* at 542. The counterplaintiffs in the lawsuit filed by the attorney general to recoup these costs claimed that DNR's malfeasance in licensing and supervision of a licensee rose to the level of inverse condemnation, and the Court of Appeals disagreed. It found that the counterplaintiffs' claims failed as a matter of law because

"[f]irst, the granting of a license to . . . a private corporation for the purpose of allowing that . . . corporation to conduct a private business cannot be regarded as a taking of private property by the government for public use" and, second, "the state's alleged misfeasance in licensing and supervising the operation does not constitute 'affirmative actions directly aimed at the property' " for purposes of an inverse-condemnation claim. *Id.* at 560-562.

This analysis applies with equal force here. EGLE's decision to grant or deny the permit does not evidence EGLE's operational control over the dam or the reservoir, nor is it sufficient action to form the basis for an inverse-condemnation claim as a matter of law. Akin to the licensing action in *Ankersen*, EGLE's permit reflected authorization, not an order, to return water levels to the normal summer lake level. There is no indication that the dam's current owner (Boyce) or its future owner (FLTF) objected to this authorization. To the contrary, media releases, statements in the joint application for the permit, and e-mail correspondence all indicate an intent on the part of Boyce and/or the FLTF to maintain Wixom Lake at the normal summer lake level. Mueller's concerns regarding safety after the FERC license was revoked voiced a concern with lack of financing for the gate operators' salaries and necessary repairs, not a concern that the lake level in and of itself was unsafe. It was the level ordered by the Midland Circuit Court in the Part 307 hearing and, also, the level ordered by FERC prior to revocation of the license. No engineering report or analysis of the dam prior to its failure indicated a concern that this level posed an imminent danger to the community or was otherwise unsafe. The issuance of the 2020 permit is not sufficient to form the basis of the inverse-condemnation claim as a matter of law.

B. NEITHER DEFENDANT ABUSED ITS GOVERNMENTAL AUTHORITY IN ACTIONS TAKEN WITH RESPECT TO THE EDENVILLE DAM.

The record lacks evidence that either defendant abused its governmental authority in issuing this permit or otherwise failing to take more prompt action in remedying the dam's deficiencies. Mistak, Trumble, and other witnesses appearing as current or former employees of defendants testified unequivocally that they did not prioritize environmental concerns or natural resource damages over public health, safety, or welfare. The Court finds their testimony credible and without contradiction in the record before it.

In addition, the process that defendants used and factors taken into consideration were consistent with what Sturtevant testified to as appropriate for a state regulator. Based on decades of experience working in dam safety as a governmental regulator, Sturtevant testified that public safety is paramount and that it is a state regulator's duty to consider environmental concerns and their impact on the local community in making decisions. He also testified that in his experience the FERC inspection reports are an important and crucial starting point for state dam regulators.

Both defendants actively corresponded with FERC before and after the license revocation. Kruger testified that he corresponded with FERC regarding the Edenville Dam at least 75 times, more than any other hydroelectric power dam under his supervision. When the license was revoked, Trumble submitted a request for the inspection records within days and then followed up with both FERC and Boyce, as the dam owner, in the months that followed. FERC's regulatory authority ended on September 25, 2018, and nine days later, two EGLE engineers were present at the Edenville Dam for a visual inspection.

It was largely because of EGLE's investigation that the lack of adequate spillway capacity under Michigan law came to light. As late as March 2020, Boyce's engineer believed the dam satisfied Michigan's standards for spillway capacity under Part 315. EGLE's engineer independently calculated the spillway capacity and reached a different conclusion, and he was in active communication with Spicer's engineers regarding plans to remedy the lack of adequate spillway capacity. Sturtevant testified that Trumble's calculations of ½ PMF were reasonable as was the proposed timeline for constructing the auxiliary spillway(s).

While Sturtevant opined that the dam should have been ordered to run-of-the-river level until these repairs took place, the record lacks support for a finding that EGLE was required to do this or even had authority to order it under state law unless there was an imminent risk of failure.

The lake level was set by the Midland Circuit Court under Part 307 and was consistent with the levels set by FERC for decades earlier. Indeed, FERC never ordered Boyce to lower the water levels, despite its authority to do so, nor did FERC advise EGLE that such an order was necessary or prudent under Michigan law.

When the FLTF became involved, Trumble notified Hansen of Michigan law's requirement that dam owners submit inspection reports prepared by a licensed engineer to EGLE. Numerous e-mails, meetings, and analyses were exchanged between them.

It is true that Michigan law requires that high hazard potential dams like the Edenville Dam have sufficient spillway capacity to pass the half probable maximum flood criteria. MCL 324.31516(2). However, it does not require the water level in reservoirs impounded by a dam to automatically be lowered to run-of-the-river operations if this spillway capacity is not present. When EGLE assumed jurisdiction over this dam in 2018, the last engineering report on file

reported that the dam satisfied the half probable maximum flood standard. It was EGLE's analysis which called this into question and ultimately determined otherwise.

Moreover, EGLE's authority to order that the dam be operated at run-of-the-river is limited by law to situations where "significant damage to the public health, safety, welfare, property, and natural resources, or the public trust in those natural resources or damage to persons or property occurs or is anticipated to occur due to operation of the dam . . . ." MCL 324.31519(1). This would have been a difficult standard to meet based on the inspection reports available to EGLE at the time it assumed regulatory jurisdiction of the dam. None of the CSIRs or any other engineering report notified EGLE that significant damage to persons or property would occur from authorizing the water level at the level it existed for decades under FERC regulation; and, moreover, Boyce would have had the opportunity for a hearing prior to finalizing this order under Michigan law. MCL 324.31519(3). Rather, the record reflects EGLE's continued correspondence and efforts to work with Boyce and the FLTF to bring the dam into compliance with Michigan law.

Additionally, there still remains a question whether focusing on the spillway capacity would have prevented the failure. The IFT surmised that engineering efforts were so focused on compliance with the spillway regulations and avoiding overtopping that, perhaps, the left embankment's stability was given less attention than it should have been in hindsight. And the expert witnesses seemingly agree that adding a berm or fill to this embankment may have prevented the failure. However, these are hindsight observations. Static liquefaction, the mechanism by which the dam ultimately failed, was not widely understood as a risk for earthen embankment dams, and there was scant, if any, warning of a significant risk of failure. Olson and France testified credibly that non-seismic static liquefaction is largely misunderstood and that its

triggers are not well known in the industry, still today. Even engineers conducting back analysis disagree on the exact cause of liquefaction-related failures.

The Court finds no evidence that the dam's need for repair, including remedying its inadequate spillway capacity, was concealed from the public or the Midland Circuit Court. To the contrary, the FLTF was in the process of securing funding to conduct necessary repairs of the dam through a local assessment, a bond, and a grant from the state. Numerous public meetings and hearings were held regarding this. In short, the record does not support a finding that any defendant abused its governmental authority in its actions with respect to the Edenville Dam.

1. THIS CASE IS DISTINCT FROM *PETERMAN* AND *MAYS* IN SIGNIFICANT WAYS

It is also worth noting that this case is distinct from two relatively recent cases in which the state's actions were found sufficient for an inverse-condemnation claim. In this case, the state did not create the hazard that directly caused damage to plaintiffs' property. Unlike *Peterman,* in which the DNR constructed the jetty that caused damage to the plaintiffs' property, or *Mays*, in which the state-employed emergency manager signed a contract changing the source of the city water supply, defendants served only as regulators of this dam. *Peterman*, 446 Mich at 191; *Mays*, 506 Mich at 169. EGLE did not construct or alter the dam in such a way as to decrease its spillway capacity under either federal or state standards, nor did it issue an engineering report or analysis that ordered a higher water level than was advised. Rather, EGLE received by default a dam with inadequate spillway capacity under federal law and a history of noncompliance that DNR, at least, had flagged for FERC's attention on numerous occasions prior to the license revocation. The water levels authorized by the 2020 permit were the same as those ordered by FERC without major incident for decades prior to the license revocation, supported by engineering analysis and

testimony of Spicer, and vetted through a public hearing process that included circuit court proceedings.

Also unlike *Peterman* and *Mays*, no engineering report or prior analysis warned that the dam's slopes were vulnerable to static liquefaction or warned that allowing the water level to be maintained at the level at which it was ordered under the FERC license placed the public in an imminent risk of harm. Static liquefaction—the mode of failure—was largely misunderstood. The risk associated with the lack of spillway capacity in the relevant timeframe was overtopping, which never occurred, and no report or licensed engineer advised EGLE or DNR that the dam was in imminent risk of failure.

2. THE DAM FAILED DURING AN ALMOST UNPRECEDENTED FLOOD

Finally, it is undisputed that the dam did not fail at a lake level set by the 2020 permit but, rather, it failed in the context of a 100-year flooding event over which neither defendant had any control and limited, if any, ability to predict.

The IFT report explains this in some detail. Specifically, since 1998, the FERC license for the Edenville Dam established a normal operating lake level of 675.8 feet and restricted fluctuations in this level to a range of 675.4 feet and 676.1. These levels were those adopted by the Part 307 Order issued by Midland Circuit Court and authorized by the 2020 permit. The water level at which the dam failed was well-outside of this range when viewed from a historical perspective. As explained in the IFT report, in "over a period of almost a century, Wixom Lake rarely rose significantly above the FERC-established normal lake level of El. 675.8." The pool of record prior to the May 19, 2020 event occurred in April 1929, "at 2.5 feet above the normal lake level (El. 678.3)." The Edenville Dam failed at a level almost 3 feet higher than this prior pool of

record, or 5 feet higher than the normal lake level (i.e., 681.3 feet), and with a rainfall event that was not the highest on record. Respectfully, the Court cannot find defendants abused their governmental authority in issuing a permit that authorized the normal lake level under which the dam had retained water for nearly a century and which failed only during a 100-year flooding event that was unprecedented, if not unpredictable.

In sum, even if maintaining the water level higher than run-of-the-river was a substantial cause of the dam's failure, the record does not support a finding that any defendant's actions regarding this constituted an abuse of governmental authority or that the authorization of it was a substantial cause of the dam's failure. Plaintiffs' claims essentially rest on the state's failure to abate a nuisance or prevent destruction of plaintiffs' property due to the actions of a nongovernmental entity. Neither is a sufficient basis for an inverse-condemnation claim under Michigan law. *Hinojosa*, 263 Mich App at 548; *Marilyn Froling Revocable Living Trust*, 283 Mich App at 295-296.

C. THE RECORD DOES NOT DEMONSTRATE BY A PREPONDERANCE OF THE EVIDENCE THAT THE WATER LEVEL WAS A SUBSTANTIAL CAUSE OF THE EDENVILLE DAM'S FAILURE.

The above analysis is sufficient to satisfy this Court's obligation in deciding this matter. However, for purposes of completeness, the Court also finds that the record does not demonstrate by a preponderance of the evidence that the authorized water level was a substantial cause of the dam's failure.

Each of the expert witnesses who testified in this matter were highly credible witnesses, knowledgeable, and often highly credentialed in their respective fields. Having reviewed their reports and considered their testimony, the Court finds the IFT's analysis more persuasive in its

conclusion that lowering the water level was unlikely to prevent the Edenville Dam's failure. The IFT report was drafted in closest proximity to the dam's failure and represented the most comprehensive, independent investigation available. France testified to the extensive work of this team, including hundreds of meetings, interviews, analyses, and the opportunity for comment prior to its final publication. In fact, all of the retained experts relied on some or all of its data and findings for their analysis.

The Court finds the IFT report more persuasive in its findings as to the effect of a lower water level because the IFT's models relied on data gathered from records on both the Tittabawassee and the Tobacco Rivers, as opposed to plaintiffs' experts who used USGS data available only on the Tobacco River. Because of the rainfall patterns in the region, the Court finds the IFT's approach more persuasive. Moreover, the Court also found Olson's and France's testimony credible to the extent they explained the uncertainty seemingly inherent in back analysis of a dam failure due to static liquefaction in an embankment of an earthen dam, as occurred here. The triggers of static liquefaction are not well known, even to this date, and the soil borings on which plaintiffs' experts relied were found far from the failure site with limited knowledge of the soil stratification on the left side of the embankment or otherwise. The IFT's conclusion that a lower water level would likely have delayed the dam's failure but was unlikely to prevent it entirely is credible in the Court's opinion.

Recognizing that it is plaintiffs' burden to prove by a preponderance of the evidence that the water level was a substantial cause of the Edenville Dam's failure as a part of their inverse-condemnation claim, the Court finds the record insufficient to satisfy this burden. As Olson recognized, plaintiffs' experts may very well be correct, but the uncertainty inherent in the type of

analysis required here and the data upon which they relied leads the Court to find the IFT report more persuasive.

VI. CONCLUSION

As the Court stated at the beginning of this opinion and order, plaintiffs in this case have suffered real and lasting damages because of the failure of the Edenville Dam on May 19, 2020. The claim of inverse condemnation, however, is not sustained under the facts of the case when the elements of the claim are evaluated as required by the law of Michigan.

For the reasons set forth in this opinion and order, the Court concludes:

a. Plaintiffs have not sustained their burden on their claims for liability under inverse condemnation;

b. A judgment of no cause of action in favor of defendants and against plaintiffs is entered;

c. No costs or fees will be awarded in this action;

d. In light of the Court's order herein, defendants' Motion for a Directed Verdict made at the end of plaintiffs' case-in-chief, which the Court held in abeyance, is now DENIED as moot;

e. This is a final order and closes the case.

IT IS SO ORDERED.

Date: April 23, 2026

James Robert Redford

Hon. James Robert Redford
Judge, Court of Claims