

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MAINE

MAINE PEOPLE’S ALLIANCE and)
 NATURAL RESOURCES DEFENSE)
 COUNCIL, INC.,)
)
 Plaintiffs,)
)
 v.)
)
 HOLTRACHEM MANUFACTURING)
 COMPANY, LLC and)
 MALLINCKRODT US LLC,)
)
 Defendants.)

Case No. 1:00-cv-00069-JAW

PLAINTIFFS’ PRE-TRIAL BRIEF

TABLE OF CONTENTS

INTRODUCTION 1

ARGUMENT 2

 I. The Evidence at Trial Will Overwhelmingly Support the Study Panel’s Recommendation to Pursue Active Remediation of the Penobscot River 2

 A. The Work of the Court-Appointed Study Panel Was Independent, Comprehensive, and Rigorous 2

 B. Mercury Contamination Pervades the Penobscot River Ecosystem..... 3

 C. Every Day the Contamination Persists Puts People and the Environment at Risk and Deprives the Community of an Invaluable Resource 6

 1. Contamination in the Food Web Places Human Health at Risk..... 7

 2. Wildlife, Especially Marsh Songbirds, Are in Danger 9

 3. Hazardous Mercury Concentrations Deprive the Community of an Unparalleled Resource10

 D. Without Intervention, Dangerous Conditions in the Penobscot Will Persist for Decades11

 II. The Court Has Sufficient Information to Order Active Remediation of the Penobscot Estuary Now14

 A. Mallinckrodt Calls for Additional Studies that Are Not Needed before Deciding to Pursue Active Remediation.....15

 B. Mallinckrodt’s Self-Interested Attempts to Poke Holes in the Study Panel’s Work Are Unscientific and Do Not Undermine the Panel’s Fundamental Findings18

 III. This Court Should Order the Relief Sought by Plaintiffs and Urged by the Study Panel21

INTRODUCTION

Between 1967 and 2000, the former HoltraChem chlor-alkali plant in Orrington, Maine poured an estimated six to twelve metric tons of mercury—a pernicious, long-lived neurotoxin—into the Penobscot River. The vast majority of the plant’s mercury losses occurred in the late 1960s and early 1970s, while the plant was owned and operated by a corporate predecessor to defendant Mallinckrodt US LLC. More than 40 years later, mercury still saturates the sediments of the Penobscot estuary, from north of Bangor to upper Penobscot Bay. It poisons the Penobscot food web from the bottom up, threatening both wildlife and human beings. Yet Mallinckrodt still refuses to clean up its mess.

Over a decade ago, this Court held Mallinckrodt liable under the Resource Conservation and Recovery Act (RCRA) for contributing to conditions that may endanger human health and the environment, based on the available evidence of mercury contamination. The First Circuit affirmed. Since that time, the scientific evidence of danger has multiplied. The independent scientists empaneled by this Court have worked diligently to determine whether active measures are needed to clean up the Penobscot ecosystem. After eight years of painstaking study, their unanimous answer is “yes.”

The Court-appointed Study Panel has found, decades after the principal discharges from the HoltraChem plant, that mercury still permeates Penobscot sediments and animals at unsafe levels. Mercury in food species like lobster, eel, and duck are up to five to ten times higher than the human consumption safety threshold prescribed by the State of Maine. Meanwhile, songbirds living in marshes adjacent to the River have consumed so much mercury that the levels in their blood are among the highest ever recorded, far in excess of risk thresholds established in scientific literature. These hazards have not

disappeared in the four decades since Mallinckrodt first polluted the estuary, and the sediment record reveals that—if left untreated—they will not dissipate for another 60 years or more. Instead of owning up to its responsibility, Mallinckrodt continues to dodge and deflect, crafting misleading reinterpretations of the data and quibbling over the exact severity of Penobscot mercury risks.

In light of the overriding evidence of endangerment and the Study Panel's unequivocal recommendation, plaintiffs urge the Court to order active remediation of the Penobscot estuary.

ARGUMENT

I. The Evidence at Trial Will Overwhelmingly Support the Study Panel's Recommendation to Pursue Active Remediation of the Penobscot River

The Court-appointed Study Panel conducted an unparalleled eight-year investigation of mercury contamination in the Penobscot estuary. Working with other world-class researchers, the Panel confirmed severe risks to human and ecological health. These risks will persist for multiple decades absent intervention. The Study Panelists therefore unanimously recommended active remediation. Their findings allow no other conclusion.

A. The Work of the Court-Appointed Study Panel Was Independent, Comprehensive, and Rigorous

The stretch of the Penobscot River from just north of Bangor to its confluence with Penobscot Bay is now among the best understood estuaries in the world. From 2005 through 2013, a group of internationally recognized experts intensively investigated mercury contamination in this ecosystem. At Mallinckrodt's request, the study was designed and led by a panel of neutral scientists: Dr. John Rudd, Dr. Nicholas Fisher, and Dr.

Christopher Whipple, the last of whom Mallinckrodt itself nominated to sit on the Panel. Each of the three Study Panelists is a Ph.D. scientist with decades of experience working with mercury and contaminated ecosystems. The Court appointed them to serve as special masters, and charged them to provide independent, science-based advice on whether active remedial measures are necessary to abate mercury contamination in the Penobscot.

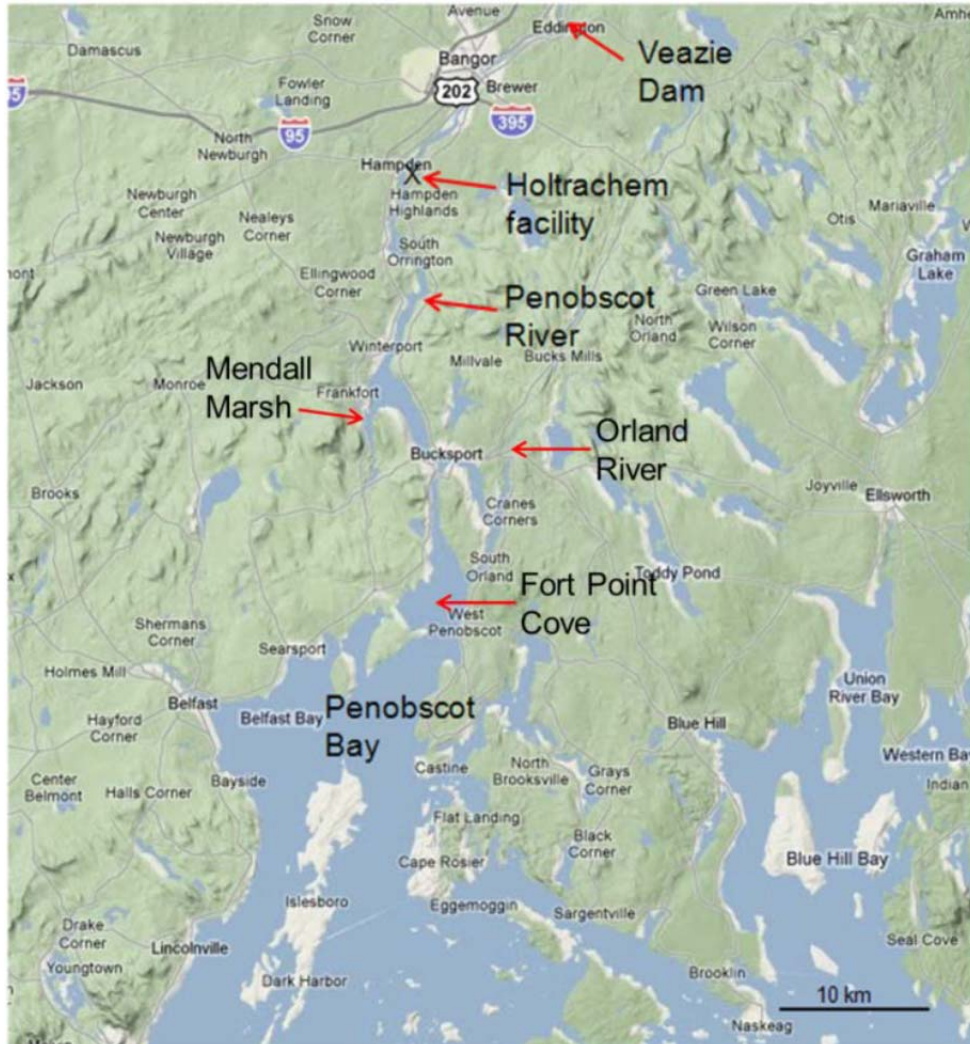
To fulfill this charge, the Study Panelists directed an exhaustive investigation, involving thousands of samples of Penobscot water, sediment, and wildlife. To help collect and interpret these data, the Panel engaged some of the world's top scientists, including Dr. Cynthia Gilmour, a Smithsonian Institution biogeochemist and pioneer in studying mercury's behavior in marsh environments; Dr. David Evers, a renowned expert on mercury's effects on birds; Dr. Rocky Geyer, a senior scientist and expert in hydrodynamics at the prestigious Woods Hole Oceanographic Institution; and Dr. Peter Santschi, one of the country's foremost environmental and marine chemists. The Study Panel's recommendations are rooted in a sound and robust scientific investigation.

B. Mercury Contamination Pervades the Penobscot River Ecosystem

The Study Panel's work confirms and expands on this Court's factual findings from the 2002 liability trial. Based on evidence adduced during the liability trial, the Court ruled that Mallinckrodt was a dominant source of elevated mercury levels in the Penobscot estuary, having dumped mercury-laden sludge directly into the Penobscot River at Orrington every day from late-1967 to mid-1970. The Study Panel has now conclusively shown that mercury continues to suffuse the Penobscot ecosystem at dangerous levels.

The Study Panel's sampling of the Penobscot's surface sediments focused on a region it designated the Upper Estuary, which stretches from the former Veazie Dam, about

ten miles upstream from the HoltraChem site, down to the southern tip of Verona Island, where the River opens into Fort Point Cove and Penobscot Bay. See Penobscot River Mercury Study, Phase II Report, Figure 18-1, p. 18-4 (reproduced below). The Upper Estuary includes tidal portions of the Orland River, a tributary that joins the main stem on the east side of Verona Island. It also includes Mendall Marsh, a roughly 1,000-acre wetland along the Marsh River south of Frankfort. Mendall Marsh is a State-designated wildlife management area, in recognition of the valuable habitat it provides to birds and other wildlife.



The extent of mercury contamination in the Upper Estuary's surface sediments is critical because of the way mercury infects an ecosystem. Once mercury has settled in sediment, bacteria living there can "methylate" the mercury, converting it from the form of mercury dumped by the HoltraChem plant to organic methylmercury. Methylmercury is the form most readily absorbed and retained by organisms. After methylmercury is ingested by sediment-dwelling organisms, it "biomagnifies," increasing in concentration as it works its way up the food web. The biomagnification of methylmercury means that creatures at the top of a contaminated food web—including humans—can have mercury concentrations in their bodies that are orders of magnitude higher than the levels in tainted sediments and the organisms that consume those sediments. Once in the body, methylmercury targets the nervous system, particularly the brain. Unborn children exposed in utero through their mothers' diets are especially vulnerable to permanent damage.

The record compiled by the Study Panel reveals that the concentrations of mercury available for methylation and biomagnification in the Upper Estuary's surface sediments are more than ten times higher than in reference areas not contaminated by the HoltraChem plant. Individual stretches like the Orland River have surface concentrations that are even more extreme. And nowhere in the Penobscot ecosystem are conditions more troubling than in Mendall Marsh. There, Mallinckrodt's pollution interacts with the Marsh's unique soil chemistry to produce dangerous methylmercury at some of the highest rates ever found in nature. The Study Panel commissioned the Smithsonian Institution's Dr. Cynthia Gilmour to investigate the conditions in Mendall Marsh. From 2009 to 2011, Dr. Gilmour and her team of specialists surveyed the Marsh, conducted three rounds of soil

sampling, and performed a detailed chemical analysis of the samples. She concluded that, much like the rest of the Upper Estuary, surface concentrations of total mercury—a measure of all forms of mercury—in the Marsh soils are two to ten times higher than in marsh reference areas in Chesapeake Bay. Moreover, the percentage of mercury that is methylmercury, and thus available for uptake by wildlife, is exceptionally high, even compared to the nation's most mercury-contaminated sites. Thus, although the Marsh's chemistry is complex, the story it tells is simple: the base of its food web is saturated with unprecedented levels of toxic methylmercury.

C. Every Day the Contamination Persists Puts People and the Environment at Risk and Deprives the Community of an Invaluable Resource

The Study Panel has shown that the high levels of total mercury in Penobscot sediments are the key driver of risk throughout the Upper Estuary's food web. The Panel, with help from Dr. Gilmour, analyzed the total mercury and methylmercury concentrations at many different surface sampling locations, plotting the two against each other. They found a strong positive correlation between total mercury and methylmercury throughout the Upper Estuary, indicating that when more total mercury is in the sediment, there is more methylmercury available to enter the food web. Thus, higher sediment mercury levels correspond to higher mercury concentrations in animals.

To determine exactly how much mercury Penobscot wildlife have bioaccumulated—ingested and retained—the Study Panel conducted a multi-year, multi-species survey. Starting in 2006, the Panel sampled fish, birds, and mammals across the Upper Estuary. The Panel amassed five years of data on mercury concentrations in eel and lobster and three years of data on black ducks—all species eaten by human beings. It also collected five years of data on birds living in Mendall Marsh, including Nelson's sparrows and red-winged

blackbirds, and on various prey fish. This data trove on wildlife mercury levels demonstrates conclusively that mercury in Penobscot sediments endangers human health, wildlife, and essential community natural resources.

1. Contamination in the Food Web Places Human Health at Risk

Mercury contamination in the Penobscot poses severe risks to human health. Mallinckrodt concedes that mercury is a known developmental toxin that causes IQ loss and permanent neurological harm to children exposed in utero. The evidence collected from hundreds of Upper Estuary eels, lobsters, and ducks reveals that methylmercury is present in concentrations that far exceed the human safety “action level” set by the State of Maine to protect against that harm. Maine considers fish to be generally safe for human consumption if they contain less than 200 nanograms of mercury per gram of fish tissue (ng Hg/g). The average eel sampled in the Upper Estuary contains two and a half times this concentration. In Mendall Marsh, mercury levels in black ducks—a seasonal food for hunters and their families—are, on average, three times higher than the State action level. The most contaminated ducks were more than five times higher. Lobsters in the Upper Estuary and Fort Point Cove also far exceed safe levels. In the most recent sampling year, tails from lobsters large enough to be legally caught at the south end of Verona Island averaged 531 ng Hg/g, well over double the State’s safe level. The most contaminated lobsters the Study Panelists sampled contained over 1,000 ng Hg/g, more than five times the safety threshold.

Consistent with its action level, the State has acted to prevent consumption of three Penobscot food species, based solely on Study Panel data. In 2011, alarmed by the high mercury levels in black ducks, the Study Panel obtained permission from this Court to

share preliminary black duck data with the State. The State then issued a consumption advisory and posted warning signs in Mendall Marsh, instructing children and pregnant women not to eat any waterfowl from most of the Upper Estuary and limiting all other consumers to no more than two meals a month. More recently, after reviewing the Study Panel's lobster data, the State issued first an emergency, and then a permanent, closure of the entire lobster and crab fisheries north of Fort Point. The State deemed the closure necessary to protect public health. Prior to the closure, unsuspecting commercial fishermen caught lobsters and crabs from the Upper Estuary and sold them to unwitting consumers every day of the fishing season. Some, like Kenneth Wyman, a twenty-six year veteran of Maine's lobster trade, fed their families—including pregnant women and young children—regular meals of these tainted shellfish.

These data have also been examined by plaintiffs' expert Dr. Philippe Grandjean, an environmental epidemiologist whose work forms the basis for the U.S. Environmental Protection Agency's (EPA's) mercury consumption safety limit, and whose testimony Judge Carter relied on in 2002. Dr. Grandjean concluded that Penobscot lobster, duck, and eel are unsafe to eat. As he will explain at trial, one meal of Penobscot seafood can contain more mercury than government safety standards advise ingesting over weeks or even months. This is especially disturbing given new research by Dr. Grandjean and others showing that mercury has toxic effects even at levels lower than current government limits. The danger is especially great for an unborn baby exposed in utero through its mother's diet. Methylmercury readily passes the placenta, so that the mother's exposure is shared with the fetus. Consumption of seafood contaminated at the levels seen here can disrupt crucial

fetal brain development and cause permanent impairment, especially if it occurs during a sensitive moment in pregnancy.

2. Wildlife, Especially Marsh Songbirds, Are in Danger

The risk to human health presented by Penobscot mercury is grave but it is not the only danger. The Study Panel also found that wildlife inhabiting the Upper Estuary are at risk of behavioral, reproductive, and other impairments due to mercury exposure—especially birds that nest and forage in methylmercury-rich Mendall Marsh.

To assess the impacts of mercury contamination on these birds and other Penobscot species, the Study Panel turned to the established scientific literature. By synthesizing peer-reviewed scientific studies that link mercury exposure concentrations with toxic effects in certain species, the Study Panel derived target mercury concentrations for birds and fish, above which the animals are at risk for adverse effects. To choose appropriate bird toxicity targets, the Study Panel enlisted Dr. David Evers, a leading expert on the effects of contaminants on avian species. Dr. Evers scrutinized field studies that correlate mercury levels in the wild with observed impairments, as well as laboratory dosing studies that document the effects of calibrated mercury ingestion on birds. Based on this comprehensive analysis, he determined that insect-eating birds with blood mercury levels higher than 1,200 ng Hg/g are at risk of reproductive impairments severe enough to cripple the local population.

When the Study Panelists compared the hundreds of samples they collected against the target derived from the scientific literature, the results for songbirds living in Mendall Marsh were stunning. One such species, the Nelson's sparrow—a small, insect-eating bird with a distinctive, raspy call—inhabits Mendall Marsh during the summer breeding

months. Of the adult Nelson's sparrows sampled at Mendall Marsh, 98 percent exceeded the bird safety target—some by as much as ten times. These are among the highest blood mercury concentrations recorded in Nelson's sparrows anywhere in the world. Even Mallinckrodt's paid consultant concedes that mercury levels in Nelson's sparrows are cause for concern, as are levels in another species, the red-winged blackbird. More than 70 percent of adult red-winged blackbirds in the Marsh exceed the target mercury concentration. In 2012, the *average* blood mercury concentration in red-winged blackbirds in Mendall Marsh was ten times higher than the Study Panel target.

3. Hazardous Mercury Concentrations Deprive the Community of an Unparalleled Resource

The human health and environmental hazards posed by Mallinckrodt's mercury contamination are severe. But avoiding them, when they can be avoided, also has costs.

Mercury has tainted the Upper Estuary's important food species, from black ducks in Mendall Marsh to the Maine lobsters at the River's mouth. Duck hunters must now weigh their pastime and a natural food source against the knowledge that feeding their families even a single meal of Penobscot duck risks the health of their children. Lobstermen like Kenneth Wyman no longer have the option of continuing to subsist off the Penobscot's resources: the State has forbidden lobster and crab fishing in the productive Upper Estuary. Mr. Wyman's daily catch from these waters, and the income it brought, is gone for the foreseeable future. Left in its place is the knowledge that the shellfish he fed his family and sold to others for decades contained dangerous levels of mercury.

Mercury pollution in the estuary also threatens to unwind progress made by local groups and the federal government to restore historic fish runs to the Penobscot River's upper reaches. Over the last decade, a community-government coalition called the

Penobscot River Restoration Trust has spent tens of millions of dollars to decommission dams that for centuries have blocked fish from migrating from Penobscot Bay, through the estuary, to spawning grounds upstream. Allowing a mercury hot zone to fester at the River's mouth just as fish are due to start passing through on their way upriver defeats the Trust's efforts to make the River hospitable to recreational fishers, as Trust ambassador Bob Duchesne will attest. Mr. Duchesne's birding business also suffers from the ongoing pollution in Mendall Marsh. Mr. Duchesne, a resident of Hudson, used to take tour groups to Mendall Marsh to see the Nelson's sparrows. But with populations dwindling and advisories against eating the ducks posted in the Marsh, Mr. Duchesne will not take tourists into a once-fruitful birding location in his own community.

For members of the Penobscot Indian Nation, like Elder Butch Phillips, the profusion of mercury in the estuary diminishes an entire way of life. As Mr. Phillips will testify, the Penobscot River is an essential element in the spiritual and cultural life of the Nation. The Nation views itself and the River as one interconnected entity. Mercury pollution corrupts that spiritual connection. For the members of other communities on the banks of the River, the ongoing pollution robs them of opportunities to fish and swim—the very things many of them hoped to do when they purchased their homes. Thus, to avoid the dangers Mallinckrodt created, community members must give up their right to make full use of the abundant resources in their own backyards.

**D. Without Intervention, Dangerous Conditions
in the Penobscot Will Persist for Decades**

In the 40 years that have passed since the bulk of Mallinckrodt's mercury flooded the Penobscot ecosystem, natural processes have not diluted mercury concentrations to safe levels. The Study Panel has shown that the ongoing hazard will persist for many

decades more if Mallinckrodt continues to wait for the system to bury its mess. In contrast to defendant's self-serving preference for "natural recovery"—that is, doing nothing—the Study Panel unanimously urges active remediation to accelerate recovery of the River. The scientific evidence compels the Panel's conclusion.

Because mercury does not degrade or detoxify, dangerous concentrations will persist in the Upper Estuary until cleaner sediments feeding the estuary eventually bury the contaminated sediments beyond the reach of insects, worms, and other organisms that introduce mercury into the food web. In the Penobscot, permanent burial is substantially delayed by the turbulent movement of currents throughout the estuary, which regularly mix and transport sediments. The Study Panel enlisted Dr. Rocky Geyer, a Woods Hole oceanographer and expert on sediment transport, to explore the movements of sediments, tides, and currents, and the slow process of permanent burial in the estuary. After extensive sampling, Dr. Geyer found that in the Penobscot, as in many other estuaries, sediments are trapped near the mouth of the River by an incoming front of salty bay water propelled by the tide. Mercury-laden sediments may settle out on mudflats or the river bottom for some period of time, but they form a contaminated "mobile sediment pool" that is regularly picked up and pushed upriver by the tides and then downriver by the current, in a repeating cycle. As a result, mercury concentrations throughout the Upper Estuary decrease very slowly, if at all, because the most contaminated sediments continue to slosh around the system.

To quantify how long the recovery process will take, the Study Panel engaged Dr. Peter Santschi of Texas A&M University. Long columns of sediment were extracted from 72 different locations throughout the estuary, including sites in the main stem of the

Penobscot River, Mendall Marsh, the Orland River, and upper Penobscot Bay. Each of these cores contained sediment layers representing decades of deposition. After an initial screening to weed out cores that lacked consistent deposition records, 58 cores were sent out for chemical analysis—one of the most exhaustive analyses at any mercury-contaminated site in the United States. In these 58 cores, Dr. Santschi examined changes in mercury levels over the last 50 years, using radioactive chemical signatures to determine approximately when various layers of sediment were deposited.

Dr. Santschi's analysis reveals a clear pattern throughout the Upper Estuary. Mercury concentrations shoot up suddenly in layers that were at the surface around the time Mallinckrodt's principal dumping occurred in the late 1960s and early 1970s. Immediately following the surge in mercury, concentrations decrease steadily. But after this initial drop-off, the decline stalls. For the past several decades, any decrease in surface mercury concentrations has been much slower. In some locations, surface concentrations are no longer decreasing at all. And at some sites, because of slow redistribution of the mercury dumped decades ago, concentrations are still rising.

For those cores that indicate some recovery, Dr. Santschi calculated the average rate of decline in mercury levels. Projecting his rates into the future, the Study Panel determined that it will take more than 30 years for average sediment concentrations in the main stem of the River to reach a level the Study Panel considers safe—a level that may still be too high to guard against all possible harms caused by mercury. In Mendall Marsh, it will take 60 years to reach the Study Panel's target. And in the Orland River, it will take 77 years for the extremely elevated surface concentrations to decrease by just half—at which point, surface sediments will still exceed target safety levels. And these are only the projections

for how long it will take for concentrations to reach the Study Panel's target. It will take a staggering 163 years for mercury concentrations in the Upper Estuary to reach a level that is still 20 percent higher than where it would be if Mallinckrodt had not polluted the River.

As grim as these projections are, they actually *underestimate* how long it will take for the mercury hazard to abate. In the first place, the projections are averages; in some portions of the River where mercury levels are declining, recovery is slower than average and organisms will be exposed to dangerous sediment mercury levels for a longer time. Second, Dr. Santschi could calculate recovery projections only for those cores in which surface concentrations are already in decline. But more than 25 percent of the sampled locations show mercury concentrations that are holding steady or rising. Recovery will take much longer in those areas. Finally, living creatures in the Penobscot (and their predators) will continue to be at risk from mercury stored in their bodies for some time after surface sediments reach safe levels. Another generation or more of danger to human health and the environment is thus the *best case* scenario for the Penobscot ecosystem, unless this Court orders an active remedy. Given these findings, the Study Panel's unanimous recommendation to actively rehabilitate the ecosystem was inescapable.

II. The Court Has Sufficient Information to Order Active Remediation of the Penobscot Estuary Now

After eight years of meticulous investigation by the Study Panel, this Court has all the evidence it needs to adopt the Panel's united recommendation to order active remediation. The Penobscot is now one of the best understood estuaries in the world. But the wealth of compelling evidence collected by the Study Panel is not enough for Mallinckrodt. In its ongoing efforts to avoid accountability, defendant offers up two general types of obfuscations: (1) calls for more studies and thus more delay, and (2) unscientific

theories and reinterpretations of the Study Panel's data that are crafted to reach conclusions favorable to Mallinckrodt.

A. Mallinckrodt Calls for Additional Studies that Are Not Needed before Deciding to Pursue Active Remediation

Consistent with its history of delay, Mallinckrodt argues that more testing is required before the Court can even begin to think about remediation. It is wrong.

For example, Mallinckrodt suggests that the Study Panel should have pinned down how much of the mercury historically discharged to the Penobscot came from sources other than the HoltraChem plant, such as pulp and paper mills. This Court already found, based on evidence including testimony from Mallinckrodt's own witness at the first trial, that Mallinckrodt is a dominant source of mercury to the lower Penobscot, having dumped vast amounts of mercury directly into the River for several years. The Study Panel's data now buttress that finding. Mallinckrodt's new argument to the contrary relies on unfounded speculation about practices at pulp and paper mills for which it has no concrete information. More importantly, apportioning blame between Mallinckrodt and other supposed past contributors in no way changes the extent of the contamination or the dangers currently presented. Nor does it weigh on the equities of ordering relief: this Court has already held Mallinckrodt jointly and severally liable under RCRA, meaning that defendant is responsible for remediating all mercury-related dangers in the estuary, and must seek contribution from any other partially responsible entity on its own.

Likewise, there is no need for more detailed risk assessments prior to remediation. Mallinckrodt's experts opine that the Court-mandated study is inadequate because the Panel did not employ the exact risk assessment methods suggested by the EPA when evaluating contaminated sites under "Superfund"—the Comprehensive Environmental

Response, Compensation, and Liability Act—a separate federal statute. However, the Superfund framework has no direct application to clean-up actions under RCRA.

Recognizing that there is more than one scientifically valid way to determine whether contamination endangers health or the environment, Special Master Calkins expressly ruled in 2011 that the Study Panel is not bound by EPA's guidance. As distinguished scientists with decades of experience in environmental contamination, the Study Panelists, assisted by other respected, independent experts, were more than competent to exercise the discretion the Court granted them to select a suitable assessment method.

The procedures the Panelists ultimately chose are sufficient to determine that people and the environment are in peril. The Panelists collected thousands of biota samples over multiple years. They compared their data to the human health safety limit developed by the State of Maine, and found lobsters, black ducks, and eels with mercury levels up to ten times higher than the limit. They compared their data to wildlife toxicity targets derived from the scientific literature and found songbirds in Mendall Marsh to be up to ten times higher. These illustrative findings, together with the full body of evidence presented in the Phase II study, establish the extreme danger to human health and the environment from mercury contamination in the Penobscot estuary. RCRA empowers the Court to abate that danger.

After nearly a decade of study, the fundamentals of how the estuary works, the extent of its contamination, and the necessary targets for a useful remediation plan are not in doubt. In other words, all the things that compel the conclusion that this Court must order active remediation to protect human health and the environment are already known. The remaining small gaps—like the exact size of the contaminated mobile sediment pool,

the extent to which pockets of contamination upstream or in mudflats add mercury to the mobile sediment pool, and the precise speed at which animals' mercury body burdens respond to changes in sediment mercury levels—do not impede prompt relief. To the extent ironing out the details is necessary before implementing a remedy, scientists and engineers will have time to do so while developing and piloting remedial options.

The same is true regarding any remaining uncertainty over what specific remedy or set of remedies to implement. After this Court has ordered active remediation, the first step will be to convene a group of experts to thoroughly vet all potential remedial options. The Study Panel has already performed much of the work that will guide this investigation. For example, it has already established that mercury in sediment leads to mercury in wildlife, and has calculated how far sediment concentrations must fall to protect human and animal health. These findings provide a framework and target for any remedial strategy. The Study Panel has also completed a preliminary assessment of several possible remedial alternatives that, at least conceptually, address the specific problems plaguing the estuary. Dr. Gilmour performed pilot tests for one such possible remedy—applying activated carbon to marsh soil to decrease bioavailable methylmercury—with two years of successful results. Any outstanding questions about the best remedial options can and should be worked out while remedial testing is underway. Given the critical, evolving threats from mercury, the Court should not permit Mallinckrodt to thwart relief through a strategy of limitless delay.

B. Mallinckrodt's Self-Interested Attempts to Poke Holes in the Study Panel's Work Are Unscientific and Do Not Undermine the Panel's Fundamental Findings

In addition to its delay tactics, Mallinckrodt's efforts to duck responsibility are manifested in self-serving, unscientific theories and data reinterpretations proffered by its paid experts—a stark contrast to the Study Panel's commitment to sound science.

The Study Panel's work comports with high scientific standards. Leading practitioners analyzed a thorough evidentiary record to generate conclusions, maintaining independence from the parties to the case. The Panel submitted its findings and conclusions to outside peer review by preeminent scientists who were independent of both the parties and the Study Panel itself, including mercury and contaminated ecosystem expert Dr. James Wiener. After scrutinizing the Study Panel's work for an entire month, Dr. Wiener determined that the Panel's conclusions are scientifically valid and well supported by the full data set. Plaintiffs' expert Dr. Charles Driscoll concurs.

Mallinckrodt's retained witnesses, on the other hand, frequently concoct theories based on unrepresentative shards of data. All three of the Study Panelists have rebuked Mallinckrodt's witnesses for "cherry picking" the data by discarding or ignoring evidence that support the overall trends, while inflating the importance of outliers. Likewise, Dr. Santschi, Dr. Evers, and Dr. Gilmour have all criticized Mallinckrodt's experts for ignoring reams of sediment and wildlife data that contradict the story Mallinckrodt wants to tell.

For example, one Mallinckrodt witness, Dr. John Connolly, argues that the rate of recovery in Penobscot surface sediments is faster than Dr. Santschi has calculated. But while Dr. Santschi considered all 58 cores that were analyzed in reaching his conclusions, Dr. Connolly chose to ignore more than half of them. Even within the cores he selected to

interpret, Dr. Connolly picked and chose among data points, sometimes incorporating decades of mercury concentration data into his calculations, and sometimes only a few years. As Dr. Santschi has testified, there is every indication that the real principle underlying Dr. Connolly's method was to select only data points that give the appearance that mercury concentrations are declining more rapidly than they are. Similarly, in crafting his own mercury targets for fish to displace the Study Panel's targets, Mallinckrodt's risk assessor, Dr. Russell Keenan, focused on a subset of the harms that mercury can cause. Specifically, he downplayed modern scientific concern about reproductive or behavioral harm—effects that do not kill individual fish right away but can nevertheless decimate a population—and instead biased his targets by averaging in much higher mercury concentrations that are enough to kill the fish directly or stunt their growth. By soft-pedaling serious harms that occur at lower mercury concentrations, he contrived targets that are much less protective than the targets set by the Study Panel and supported by the scientific literature.

Selectively including and excluding data to fabricate support for preordained theories is not Mallinckrodt's only deviation from scientific norms. Several of its witnesses champion positions that have little or no basis in reliable science. For example, some of Dr. Connolly's opinions rely on Penobscot mercury concentrations measured by the U.S. Geological Survey (USGS) in the 1970s and 1980s. But USGS itself maintains that these data are compromised because they were collected using outdated, faulty methods. Another of Mallinckrodt's retained experts, Guy Vaillancourt, goes a step farther, offering opinions based not on unreliable data, but on no data at all. Mr. Vaillancourt claims that 90 to 94 percent of all the mercury in the Penobscot River came from upstream paper mills, without

a shred of specific information on mercury releases from any one of those mills. Others of Mallinckrodt's arguments are divorced not only from sound science, but from any comprehensible logic. For example, Mallinckrodt harps on the fact that water bodies, fish, and birds outside the Penobscot are also contaminated by mercury. But the fact that some other ecosystems are also contaminated does not make conditions in the Penobscot any less hazardous.

Mallinckrodt's experts do not even adhere to standards that they themselves maintain are important. Mallinckrodt's human health witness, Dr. Michael Bolger, argues that preeminent epidemiologist Dr. Grandjean could not possibly know whether Penobscot foods present a threat to human consumers without first conducting an exhaustive study of who eats Penobscot seafood, how often, and how their individual blood mercury levels change as a result—notwithstanding Dr. Grandjean's finding that even a single portion of Penobscot eel, lobster, or duck is dangerous. Dr. Bolger is both incorrect and inconsistent, having reached the opposite conclusion—that Penobscot food presents no risk—without doing even a rudimentary human exposure study. In fact, Dr. Bolger spent only five days generating his opinions in this case, during which he skimmed the Study Panel's 2012 monitoring results and did not read the Study Panel's Phase II Report or the data underlying it.

Mallinckrodt's experts also quibble over the details of the Study Panel's conclusions. But even taken at face value, their arguments do not blunt the conclusion that a persistent endangerment exists. For example, based on another flawed analysis from Dr. Connolly, Mallinckrodt insists that sediment mercury concentrations in the Penobscot are only three to five times higher than in reference areas, not ten times higher as the Study Panel found.

As the Study Panelists will explain, three to five times higher is still far too elevated, particularly given the unprecedented methylation rates in Mendall Marsh and the dangerous mercury levels measured in wildlife. Similarly, Dr. Betsy Henry, who has never conducted a bird study, nitpicks the threshold the Study Panel used to measure risk to Penobscot songbirds, coming up with her own, less protective target. But she nevertheless concedes concern about Nelson's sparrows and red-winged blackbirds nesting in Mendall Marsh, whose blood mercury concentrations exceed even her inflated threshold. And although Mallinckrodt contests Dr. Santschi's projected recovery rates, Dr. Connolly's opportunistic recalculations still show that parts of the ecosystem, including Mendall Marsh, will not reach the Study Panel's safety targets for many decades.

As a last-ditch effort to discredit the Court-appointed Study Panel, Mallinckrodt resorts to accusing the Panel of hiding and intentionally misrepresenting data. Its accusation is outlandish. This ad hominem attack on the Court's officers, like the rest of Mallinckrodt's scientific improprieties, inconsistencies, and quibbles, reflects an increasingly desperate struggle to wrest a favorable story from unfavorable facts. But despite its contortions, Mallinckrodt fails to undercut the Study Panel's core conclusion that the Penobscot is in urgent need of active remediation.

III. This Court Should Order the Relief Sought by Plaintiffs and Urged by the Study Panel

The time has come to clean up the Penobscot. The Study Panel has assembled an unassailable body of evidence that the Penobscot estuary is contaminated with mercury, that the mercury pervades the food web at levels dwarfing accepted scientific and government thresholds, and that the contamination will not abate naturally within a reasonable time period. Plaintiffs ask this Court to adopt the Panel's findings that this

contamination endangers human health and the environment, and that waiting decades for natural processes to dilute the contamination is unacceptable in light of the ongoing risks. Consistent with its authority under RCRA and its traditional equitable discretion, this Court should order Mallinckrodt to fund (1) targeted exploration by independent mercury scientists and engineers of all potential options for active remediation, (2) the collection of additional data necessary to design appropriate remedies, (3) pilot and other testing as needed, (4) prompt implementation of a remedy or suite of remedies designed to reduce mercury concentrations below the safety targets set by the Study Panel, and (5) ongoing monitoring to assess the effects of remediation and track recovery of the ecosystem.

RCRA favors granting just such an injunction. Upon a finding that contamination may cause an imminent and substantial endangerment to health or the environment, RCRA's citizen suit provision empowers courts to grant any relief necessary to address the possible endangerment. 42 U.S.C. § 6972(a). Thus, under RCRA, courts may impose equitable remedies not only to ameliorate harms that have already come to pass, but also to "eliminate *any risks* posed by toxic wastes." S. Rep. No. 98-284, at 59 (1983) (emphasis added) (quoting *United States v. Price*, 688 F.2d 204, 213-14 (3d Cir. 1982)). As the Third Circuit noted in a seminal case, RCRA thereby "enhance[s] the courts' traditional equitable powers by authorizing the issuance of injunctions when there is but a risk of harm, a more lenient standard than the traditional requirement of threatened irreparable harm." *Price*, 688 F.2d at 211. More than that, as the First Circuit recognized in an earlier phase of this litigation, RCRA places "a congressional thumb on the scale in favor of remediation" in the face of "environmental hazards." *Me. People's Alliance v. Mallinckrodt, Inc.*, 471 F.3d 277, 297 (1st Cir. 2006). This case proves the wisdom of that directive.

The evidence compiled since the first trial confirms that Penobscot mercury has already placed the health of humans and wildlife in danger. Three of the Penobscot species commonly eaten by people contain mercury concentrations many times greater than the safe consumption limit prescribed by the State of Maine. In fact, they are so far over the limit that the State has acted to prevent or limit consumption of lobster and duck, and Dr. Grandjean advises that eating even one meal of Penobscot lobster, duck, or eel could damage a developing brain. Likewise, the data show that Penobscot animals have ingested enough mercury to imperil their own survival. Songbirds in Mendall Marsh have blood mercury concentrations up to ten times higher than levels associated with impaired reproduction.

The equities strongly favor injunctive relief. Every day, the ongoing endangerment in the Penobscot estuary forces citizens to choose between protecting their health and fully utilizing a rich and iconic River system. The Penobscot provides fish and shellfish to people across the State and around the world; serves as a source of livelihood, recreation, and spiritual sustenance; and hosts myriad species of birds and other wildlife. The public interest compels active remediation, especially in light of the fact that, for more than 40 years, Mallinckrodt's contamination has contributed to depriving the public of a healthy River.

Mallinckrodt cannot offer any comparable competing interest on the other side of the balance. It has not alleged that it will have any difficulty in financing an active remedy. And its decades of evasive behavior hardly inspire generosity or leniency. Indications of serious downriver contamination arose as far back as the 1970s, when sampling revealed elevated mercury concentrations in downstream surface sediments. In the 1990s, both the

U.S. EPA and the State of Maine asked Mallinckrodt to investigate whether the plant's mercury was creating downriver risks. Mallinckrodt ignored the requests. As a result, the River ecosystem remains dangerously contaminated many years later. And still, Mallinckrodt attempts to shirk responsibility for the mess it created. After fourteen years of litigation and eight years of investigation, Mallinckrodt is the only known major source of mercury to the estuary. Yet, despite having been held jointly and severally liable more than a decade ago, it continues to insist, without any proof, that other entities that are not joined in this suit are the real culprits and that, in any event, nothing can or should be done to repair the damage.

There are promising remedial options to be explored, including but not limited to those identified by the Study Panel. Dr. Driscoll adds several specific options to investigate, including dredging targeted areas, isolating contaminated sediments by capping them with an impermeable layer of material, and introducing oxygen or nutrients to the system to inhibit methylation. The process of investigating remedial alternatives can be designed to rule out any options that themselves would cause further harm. Plaintiffs urge the Court to initiate an efficient process for identifying and implementing a scientifically sound and environmentally protective cleanup.

The entire Penobscot estuary—including its human residents—has lived with the fallout from Mallinckrodt's dumping for more than 40 years. The Court's own experts have determined that, without an active remedy, it will have to do so for decades or even a century more. Given the overwhelming evidence of danger to human and wildlife communities, it is time to stop delaying and instead move with all possible speed toward an active cleanup.

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Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on May 27, 2014, I electronically filed Plaintiffs' Pre-trial Brief with the Clerk of Court using the CM/ECF system, which will send notification of such filing to all counsel of record in the above-captioned matter.

I hereby certify that on May 27, 2014, I mailed the document by United States Postal Service to the following non-registered participant:

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