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Via E-mail and U.S. Mail

Jayne Joy, Executive Officer
Dr. Linda Candelaria, PhD
Santa Ana Regional Water Quality Control Board
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Email: RB8.CuTMDL@Waterboards.ca.gov;
Jayne.Joy@waterboards.ca.gov

Re: City of Newport Beach Supplemental Comments on Proposed Basin Plan Amendments to Incorporate Total Maximum Daily Loads (TMDLs) for Copper (Cu) in Newport Bay

Dear Ms. Joy and Dr. Candelaria:

On behalf of the City of Newport Beach ("City" or "Newport Beach") we provide the following comments on the Santa Ana Regional Water Quality Control Board's ("Regional Board") Proposed Basin Plan Amendments to Incorporate Total Maximum Daily Loads ("TMDLs") for Copper ("Cu"), including the June 29, 2021 Staff Report providing a Metals Impairment Assessment ("Staff Report") and the June 29, 2021 Substitute Environmental Document ("SED") for the Copper TMDLs.

The City appreciates the opportunity to comment on the revised Copper TMDL documents and, as stated in the separately submitted comment letter from City staff, Newport Beach is pleased to participate as a stakeholder in the Regional Board's regulatory process. The City believes it is wise for the Regional Board to continue to take time to consider comments to the current draft Copper TMDL, particularly because: (1) the conditions in Newport Bay are improving based on the lack of aquatic toxicity within the bay (described below); and (2) because the current form is vulnerable to numerous legal challenges, as summarized below.

BACKGROUND

Background relevant to the TMDLs includes evaluating (i) the copper levels within the marine environment of Newport Bay; (ii) the effect of the marine environment upon boats and the use of copper antifouling paint ("Cu AFP"); (iii) state and federal activities related to both the marine environment and Cu AFPs; and (iv) the findings and proposed mandates in the Copper TMDL.

Copper Levels in Marine Environment

The Regional Board and interested parties have evaluated copper levels in Newport Bay for many years. Much of the bay is in compliance with criteria the Regional Board is applying, particularly those areas that receive significant flushing and tidal influence and, even in areas where copper levels are elevated above criteria, there is no evidence of aquatic toxicity. (See May 9-10 2019 Workshop Comment 2 of Chris Miller, City of Newport Beach, and Comment 3 of Dr. Susan Paulsen, Exponent.) Whether compliant results are obtained depends on where one measures, the amount of circulation and flushing, and the tidal influence. (Id. at Comment No. 2.)

The Regional Board points to certain areas of non-compliance relying largely on data summarized in a 2016 Staff Report and a 2014-2016 impaired water list. (See e.g., July 26, 2021 Regional Board Resp. to May 9-10, 2019 Workshop Comments at p. 52; July 21, 2021 Regional Board Resp. to Aug. 2018 Comments at p. 6.) Copper levels in the Newport Bay have been tested and compared to levels listed in the California Toxics Rule ("CTR"); however, a site-specific copper limit has not been developed using a water effects ratio ("WER") that reflects the bay's water chemistry and species adaptation. (40 C.F.R. § 131.38; USEPA Feb. 22, 1994 WER Guidance Memorandum available at https://www.epa.gov/sites/default/files/2018-10/documents/use-water-effect-ratio-wqs-memo-davies.pdf.)[1] Instead, the Regional Board has been referring to the 3.1 micrograms per liter ("µg/L") CTR value listed in 40 C.F.R. section 131.38 without calculating and applying the WER and without obtaining a four-day average of copper levels as required by the rule.

Effect of Marine Environment on Boats and Vessels

While the copper within the marine environment is relevant to the TMDLs, the effect of the marine environment upon boats is also relevant to understand the applicable legal frameworks. The marine environment causes growth of barnacles, algae, and other organisms on boats and vessels. (See e.g., Vessel Incidental Discharge Act ("VIDA") Proposed Regulations, 85 Fed. Reg. 67818, 67823, 67829-30 (Oct. 26, 2020).) According to the State Lands Commission ("SLC"), invasive species in California coastal waters threaten the environment, economy, and human health. (See SLC Nov. 25, 2020 Comments to USEPA on VIDA Proposed Regulations, available at https://documents.coastal.ca.gov/reports/2021/1/Th6a/Th6a-1-2021-exhibits.pdf.)

[1] A water effects ratio is a way to account for a difference between toxicity of the metal in laboratory dilution water and its toxicity in the water at the site. (USEPA 1994 Guidance, *supra,* at p. 2.)

Also, USEPA has emphasized that antifouling compounds, like Cu AFPs, are necessary to prevent or inhibit the attachment and growth of biofouling organisms. (85 Fed. Reg. at p. 67823, 67829-30.)
According to the USEPA Cu AFPs account for approximately 90 percent of the volume of sales of biocides nationwide, particularly since tributyltin ("TBT") was banned by Clean Hull Act of 2009. Copper is less harmful to the aquatic environment than TBT, but can leach copper into surrounding waters. (85 Fed. Reg 67818, 67866-67 (Oct. 26, 2020).)

Relevant State and Federal Activities Relevant to the TMDL

A series of regulatory activities at the state and federal level are relevant to the proposed TMDL. At the state level, on July 1, 2018, the California Department of Pesticide Regulation ("DPR") promulgated a regulation for a maximum allowable leach rate for Cu AFPs. In the summer of 2019, DPR (partnering with the City) conducted monitoring in Lower Newport Bay to determine the efficacy of the low-leach CuAFPs and found dissolved Cu concentrations ranged from 1.49 to 6.02 µg/L. Half of DPR's 16 isolated samples exceeded the 3.1 µg/L CTR value listed in 40 C.F.R. section 131.38 but further evaluation is needed once a CTR limit for Newport Bay is determined based on WER and other regulatory calculations. DPR stopped monitoring due to COVID-19 protection measures and expects monitoring to resume in summer of 2022 and in 2023, approximately ten to 12 months from now. (Staff Report, § 4.4.2.)

At the federal level, Congress has charged USEPA with establishing environmentally sound standards that address fouling and other discharges incidental to the normal operation of vessels under the federal Vessel Incidental Discharge Act ("VIDA"), 33 U.S.C. §§1311, 1314, 1317, 1322, 1361. Less than 10 months ago, EPA proposed regulations under VIDA to address antifouling and in-water cleaning and capture ("IWCC") system discharges for vessels that are 79 feet or greater in length. In November 2020, both the State Water Resoures Control Board ("SWRCB") and the SLC opposed USEPA's proposed regulations as not stringent enough. Based thereon, time is needed to determine how the proposed VIDA regulations and the Copper TMDL measures can be harmonized.

At both the state and federal levels, Cu AFPs are legal pesticides subject to registration and regulation by USEPA pursuant to the Federal Insecticide, Fungicide, Rodenticide Act ("FIFRA") (7 U.S.C. § 136) and by DPR (Cal. Food & Agric. Code, §12500). Section 5.6.1.1 of the Staff Report recognizes that "[t]hese agencies have the authority to take direct regulatory actions on pesticides, including the imposition of restrictions on the sale *and use* of Cu AFPs in Newport Bay, and/or cancellation of particular uses or registration." (Emphasis added.)

The Proposed TMDL Findings and Mandates

The administrative record related to the Copper TMDL establishes that Cu AFPs, regulated pesticides, are the largest sources of copper in the Bay from passive leaching and hull cleaning. (Draft BPA, Att. A, Resolution, at p. 5.) Since copper discharges from boats are the largest source of Cu in Newport Bay, the highest priority of the proposed Copper

TMDL's Implementation Plan is to ***reduce or eliminate*** Cu discharges from Cu AFPs. (Id. at p. 9.) Some of the recommendations listed in the Attachment A of the Draft BPA are to: (i) "***clean boats on a reduced frequency schedule***;" (ii) implement a diver certification program; and (iii) require underwater hull cleaners to use soft cloth or container/filter methods. (Id. at pp. 13-15, emphasis added.) The TMDL Resolution states:

> The implementation plan(s) ***shall consider*** strategies to:
>
> 1) Convert boats from current Cu AFPs to lower leach rate Cu AFPs or non-biocide AFPs/coatings . . . . The order of ***use*** preference for alternative AFPs/coatings is: 1.1) Cu AFPs with leach rates at or below 9.5 µg/cm^2/d . . . ,1.2) non-biocide AFPs/coatings, 1.3) non-Cu biocide AFPs (***The conversion of Cu AFPs to non-Cu biocide AFPs is not recommended***.) Recommended BMPs for hull cleaning, and label use recommendations should be followed for these paints (see 1.2.1 above);
>
> 2) Require new boats to ***use*** lower leach rate Cu AFPs (DPR's regulation - leach rates at or below 9.5 µg/cm2/d) or non-biocide AFPs/coatings. Recommended BMPs for hull cleaning, and label ***use recommendations*** should be followed for these paints (see 1.2.1 above). (The use of non-Cu biocide AFPs is not recommended;
>
> 3) Determine the Cu AFPs currently in use and Cu discharges to the Bay from those Cu AFPs, especially for commercial vessels.
>
> 4) Provide controls/incentives for marina owner/operators, and individual boat owners in marina leases, permits, or other mechanisms, such as the required use of BMPs and/or the use of incentives to boaters who convert to lower leach rate Cu AFPs or non-biocide AFPs.

(BPA Att. A. at p. 15, emphasis added.) Clearly, the Copper TMDL expressly requires reduction or elimination of copper from Cu AFPs, and the only way to eliminate the copper from Cu AFPs is to eliminate the use of the registered pesticides that are relied upon for antifouling. Further, Attachment A to the Staff report instructs that conversion to non-Cu biocide AFPs is not recommended, and, therefore, the Regional Board is using the TMDL process to recommend non-biocide AFPs as substitutes for Cu AFPs. Based thereon, the Regional Board is proposing to regulate the use of registered pesticides, which is unlawful.

In contrast to the Regional Board, USEPA has found that there are no current safe substitutes for Cu AFPs. "[D]espite the potential impacts of copper-based coatings, ***there is a concern that replacement of copper with other biocides may cause different, and potentially more harmful, environmental impacts. EPA determined that there are no direct substitutions for copper as a biocide*** that are as affordable or as effective, without posing similar risks to non-target aquatic species (U.S. EPA, 2018). As such, EPA is not proposing to require the selection of an alternative antifouling coating to copper antifouling coating for vessels." (85 Fed. Reg. 67818, 67867 (Oct. 26, 2020) [emphasis added].) USEPA implicitly recognizes

the need for *effective* pesticides, whereas the Regional Board has not. (See e.g., Regional Board July 12, 2021 responses at pp. 14-15 stating: "The use of non-biocide paints does not have boater confidence yet. . .")

LEGAL COMMENTS

While we understand the Regional Board has requested that we provide only new comments, Comments I through IV and VI in this letter reiterate the comments we provided on August 24, 2018 with additional rationale, legal reasoning, and/or facts to support each point. Comment V provides an additional legal argument.

In summary, we found that despite the 2021 revisions to the Staff Report and SED, the Copper TMDL and its supporting documents still suffer from major legal deficiencies. ***First***, the proposed TMDL still unlawfully fails to heed the Legislative prohibition against local governments attempting to regulate the sale and use of registered pesticides. ***Second***, since the City cannot lawfully control the use of registered pesticides, it has no control over the primary pollutant loading mechanism and is therefore not properly considered a discharger. ***Third***, the deletion of the State Lands Commission from the list of dischargers continues to be arbitrary when the City was originally identified as a discharger for the same reasons. ***Fourth***, the Regional Board's implementation schedule still fails to provide sufficient time and continues to be unsupported. ***Fifth***, the Regional Board's CTR and TMDL evaluations fall short of regulatory requirements. ***Sixth,*** the SED does not satisfy requirements of the California Environmental Quality Act. For all these reasons, the Copper TMDL cannot be adopted in compliance with the law.

I. The Copper TMDL Still Requires Unlawful City Regulation of Registered Pesticides and now Poses Potential Conflicts with Proposed Federal Rules

Like all prior versions, the current revised Copper TMDL documents attempt to conceal the fact that, if adopted, the Regional Board will be requiring the City to regulate the sale and/or use of registered pesticides, which is prohibited by state law. The proposed Copper TMDL also raises concerns related to the recent regulations USEPA has proposed under VIDA for antifouling.

A. Unlawful City Regulation of Registered Pesticides

The Regional Board's responses to our prior comments reflect a continued reliance on the City to become involved in regulation of Cu AFP, a registered pesticide. On July 12, 2021, the Regional Board provided responses to comments ("2021 RTC") for the comments that we previously submitted on August 24, 2018. The 2021 RTC frequently cross references and incorporates the Regional Board's September 29, 2018 responses to comments we submitted on October 14, 2016 ("2018 RTC").[2]

[2] The 2021 RTC refers to the 2018 RTC as "Response to Comments Document 2018."

The 2021 RTC states that "boat conversions to non-biocide AFPs are a recommended strategy to reduce Cu discharges from Cu AFPs; the dischargers are required to consider this strategy, but this task is not required to be one of the dischargers' strategies to achieve the TMDLs." (2021 RTC at p. 5.) Yet, these actions are required. First, it is not possible to achieve the limits in the proposed TMDL without eliminating or reducing the use of lawful Cu AFPs, and the Regional Board's administrative record reflects this consistently. Specifically, page 52 of the 2021 RTC incorporates the 2018 RTC, which in part refers to the board's response to comment 5.2. There, the Regional Board states: "[C]ompliance with the Copper TMDLs may be achieved, at least partially, by strategies other than, ***or in addition to***, the conversion to alternative AFPs." (2018 RTC at p. 5, emphasis added.) Stated differently, compliance with the Copper TMDL will be fully achieved only when the regulated community converts from Cu AFPs – which 90 percent of the community is relying upon for effective and necessary antifouling. Compliance is not possible without banning a pesticide that the DPR, FIFRA and EPA have approved. Indeed, only months ago in October 2020, USEPA considered and rejected the idea of converting from Cu AFPs at this time. (85 Fed. Reg. at p. 67867 [explaining that EPA is not proposing alternative antifouling coating to copper antifouling coating.].)

Based on the foregoing, the Regional Board continues to intend to require that the City undertake what USEPA refuses to do, namely to ban pesticides that vessels need to address fouling, which the SLC itself has concluded threatens the state environment, economy, and human health. (SLC Nov. 25, 2020 Comments to USEPA on proposed VIDA Regulations at p. 1.) Even if the City could do so, state law prohibits it. Food and Agriculture Code section 11501.1, subdivision (a), forbids any action by local government to "prohibit or in *any way attempt* to regulate *any matter relating to* the registration, sale, transportation, *or use* of pesticides . . . ." (Emphasis added.) The Regional Board appears to believe its "incentive" approach is a way to skirt the preemption issue the City has identified. The Legislature could hardly have written its preemption language to sweep more broadly. The Regional Board's suggestion that "incentives" to influence the sale and use of registered pesticides constitutes a loophole that can subvert the Legislature's intent is wholly without merit.

Reliable, safe, and cost-effective alternatives to Cu AFPs do not exist. USEPA implicitly recognizes need for *effective* pesticides, whereas the Regional Board has conceded that substitute coatings are not as effective and thus undermines the pesticide program. (See e.g., Regional Board July 12, 2021 responses at pp. 14-15 stating: "The use of non-biocide paints does not have boater confidence yet. . ."[I]it's true that there are few studies regarding the extent of potential human health and environmental effects of non-biocide AFPs. . .")

Over time, antifouling coatings have undergone change, from tributyltin, or TBT, which was banned by Clean Hull Act of 2009, to copper and now to other potential substitutions. In 2018, we provided an August 19, 2018 report, which identified the impracticalities of substituting Cu AFPs in the current marketplace and discussed a number of changes that must first occur to effect industry-wide movement to alternate AFPs/coatings that are safer than, and equally efficacious to, Cu AFPs. We urged the Regional Board to consider, as USEPA now has, the dangers of forcing a "regrettable substitution," and causing new environmental problems with its proposed regulation. Now, consistent with what Dr.

Whittaker concluded in the August 19, 2018 report, we again have identified "**zero** commercially available non-Cu AFPs that are safer and perform as well as Cu AFPs."

Indeed, attached hereto as Attachment A is an August 4, 2021 report that found that of the alternative paints tested, three contained high levels of per- and polyfluoroalkyl substances ("PFASs"). Only CeRam-Kote 54 SST did not have detectable concentrations greater than 400 nanograms per liter ("ng/L") to 50,000 ng/L for specific PFAS products. PFAS chemicals may have been present at concentrations below the detection limit. The Regional Board is well aware of the human health threats associated with PFAS based on statewide efforts presented at the waterboards.ca.gov PFAS Webpage. Public health activists are advocating a society-wide ban on the use of these so-called "forever chemicals," the most harmful of which include perfluorooctanoic acid ("PFOA") and perfluorooctanesulfonic acid ("PFOS"). PFOA was detected at high levels in one of the alternative AFPs tested, namely in e-Paint. PFAS are linked to liver damage, cancer, and a wide range of adverse health effects, according to the SWRCB.

B. The Proposed Copper TMDL Conflicts with proposed VIDA Regulations that the SLC and SWRCB Contend are not Stringent Enough; Commercial Vessels could be Regulated under VIDA Less Stringently than Recreational Vessels under the Copper TMDL

In addition to the preemption issue, PFAS, and other concerns raised above, the proposed Copper TMDL conflicts with USEPA's proposed antifouling regulations for commercial vessels subject to VIDA. Indeed, both the SLC and SWRCB believe that USEPA's uniform federal standards are not stringent enough and both acknowledge VIDA preempts contrary state regulations. (See also Staff Report at p. 86.) If proposed federal standards are less stringent and if both the Copper TMDL and VIDA regulations are promulgated, then it is quite possible that smaller recreational boats would become subject to regulatory standards that are more stringent than the standards commercial vessels are subject to under VIDA. To avoid this result, the Regional Board should instead harmonize its proposed measures with those USEPA is developing under the proposed VIDA regulations related to antifouling measures.

As drafted, some of the measures that the Regional Board is proposing in the Copper TMDL are contrary to USEPA recommendations under VIDA. For example, the Regional Board desires less frequent cleaning of boat hulls (BPA Att. A, at p. 13) whereas "EPA is proposing that vessel hulls and niche areas must be cleaned regularly to minimize biofouling." (Proposed regulation 40 C.F.R. §139.22(c).) Also, the new proposed regulations set forth detailed IWCC systems that must be evaluated for consistency with the Copper TMDL best management practices for cleaning and capture.

Under the proposed VIDA regulations, the federal Vessel General Permit will mandate that all antifouling coatings be applied, maintained, and removed consistent with the FIFRA label, if applicable. (85 Fed. Reg. 67818, at p. 67829.) This approach is consistent with the preemption issues we raise above for state laws administered by DPR. Moreover, in California, a 2013 Vessel General Permit ("VGP") regulates discharges incidental to the

normal operation of commercial vessels. If USEPA's VIDA regulations are finalized, the state's VGP will fundamentally change and govern some of the discharges the proposed Copper TMDL seeks to regulate from commercial vessels.

Time is needed to evaluate how the proposed USEPA VIDA regulations and amended VGP will affect the Copper TMDL best management practices related to application, maintenance, and removal of Cu AFPs.

II. The City is Not a Discharger

The Regional Board's continues to assume, incorrectly, that the City is a discharger of Cu AFP, and, therefore, the Copper TMDL and its Implementation Plan are based upon incorrect assumptions. The Regional Board contends the City is a discharger in this regard because the City has been delegated authority over certain tidelands: "The City and County thereby have the ability to exert control over Cu discharges from Cu AFPs due to passive leaching from boat hulls and/or hull cleaning activities." If it were true that the City could regulate the sale and use of Cu AFP, then the Regional Board's position would arguably be consistent with State Water Resources Control Board decisions. (See, e.g., *In the Matter of Petition of San Diego Unified Port District*, State Water Resources Control Board Order No. WQ 89-12, p. 6 ["This Board has consistently taken the position that a landowner who has knowledge of the activity taking place ***and has the ability to control the activity***, has "permitted" the discharge within the meaning of Section 13304."] (Emphasis added).) Since the state Department of Motor Vehicles requires registration of boats and vessels, DMV also has the ability control activity. Indeed, it has more control than the City over boat and vessel equipment and maintenance because of this registration program.

As previously demonstrated, however, the City lacks control over the sale, use and transportation of Cu AFP because the Legislature occupies the entire field of such regulation. The Regional Board has no basis in law or fact to contend that the City is a discharger. The City's administration of certain tidelands does not change this conclusion. The Regional Board's assumptions to the contrary are incorrect, and the Copper TMDL and its Implementation Plan are fundamentally flawed. Further, even if the City had control, the ordinary use of a pesticide product by parties other than the City does not constitute discharge of a waste. (*Ecological Rights Found. v. Pac. Gas & Elec. Co.* (9th Cir. 2013) 713 F.3d 502, 514.) Water Code section 13050 defines waste to include sewage and "waste substance" but does not capture useful products like Cu AFP. The use of products is not a waste, particularly now that USEPA has clarified the lack of viable safe alternatives. (85 Fed. Reg. at p. 67867 [stating that EPA has "determined that there are no direct substitutions for copper as a biocide that are as affordable or as effective, without posing similar risks to non-target aquatic species (U.S. EPA, 2018)."].)

In the 2021 RTC, the Regional Board continues to contend the City is responsible as a discharger of waste related to the legal use of registered pesticides. The Regional Board claims that the City is a discharger based on its authority over the tidelands, knowledge copper is being discharged from Cu AFPs, and ability to control the discharge. The Regional Board believes the City can require hull cleaning BMPs in lease agreements or in marina

regulations, require diver certification for hull cleaning, and incentivize the conversion to non-biocide AFPs and lower leach rate Cu AFPs. Even if these actions could be undertaken, full compliance could never be achieved without the City controlling the use of Cu AFPs, which it cannot do.

III. The Deletion of the SLC is Unexplained and Inconsistent with the Justification for Naming Other Dischargers

We return once again to the Regional Board's deletion of the State Lands Commission ("SLC" or "Commission") from the Copper TMDL. In the 2016 draft of the Copper TMDL, the Regional Board identified the Commission as a discharger for nearly identical reason it has been relying upon to name the City. In the later drafts and the current draft, the SLC no longer appears as a discharger. The omission of the SLC lacks support.

The Regional Board changed its mind about naming the Commission as a discharger because the Commission told the board that it lacked control over day-to-day management. The 2021 RTC states:

> "The State Lands Commission was initially included as a discharger because of the residual interest the Commission has over the submerged lands and tidelands in Newport Bay. The Commission has since clarified that their residual interest in the submerged and tidelands does not give them authority over the day-to-day management of the granted lands necessary to control the discharge of copper. . . .[T]he City and County are responsible for administering the trust lands in accordance with the granting statutes. . . . The Commission. . . . cannot direct the City or County to implement the Copper TMDLs. . . . Thus, the Commission was removed from the list of dischargers. . . .

Removing the Commission from the list of dischargers is inconsistent with the Commission's own characterizations of its responsibilities for the coastal environment. The Commission has been very involved in commenting on the new proposed EPA antifouling regulations under VIDA, identifying itself as "the world leader in biofouling regulation." SLC's November 25, 2020 comments explain that SLC is responsible as the steward in the state of the waterways and resources entrusted to its care, including the natural resources and "land management issues." SLC's expertise and stewardship role support our prior comments in 2018 that SLC, rather than the City, should be the lead responsible party for boat antifouling discharges at issue in the TMDL.

The Regional Board lacks justification for omitting the SLC from the TMDL. Indeed, in 2018 no strikethrough version of the Basin Plan Amendments was ever provided, so many stakeholders may not have even noticed this substantive change. This lack of transparency should be addressed and explained publicly.

Moreover, since the Regional Board previously concluded that the Commission and the City are dischargers for nearly identical reasons, it is arbitrary for the Regional Board to delete the

Commission from the list of dischargers without also deleting the City and County. Indeed, the Commission is a world leader in antifouling and, therefore, has greater ability to control Cu AFPs on the tidelands than the City since the preemption provisions of Food and Agriculture Code section 11501.1 are targeted at local governments, not state agencies.

IV. The Regional Board's Conclusion that the Implementation Schedule Provides Enough Time is Unsupported by Evidence or Analysis

The latest draft Copper TMDL allows just 12 years to fully implement the TMDL. The City previously commented in 2016 that the implementation period (which was then longer) was too short to allow for the effect of the new lower-copper AFPs to be observed, would require potentially unnecessary actions and costs and would not allow collection of better data. In the Staff Report, the Regional Board states that the recommended compliance schedule is "adequate for this purpose." (Staff Report, p. 3.) This conclusion is unsupported by any analysis or factual support, and the schedule should be significantly lengthened.

In the July 12, 2021 RTC, the Regional Board explained:

> Since the original compliance schedule of 15 years was based on an 83% reduction in Cu discharges from boats, a reduction in the compliance schedule from 15 to 12 years to achieve a 60% reduction is reasonable and appropriate. . . A maximum of 12 years provides ample time to collect and consider additional data and to evaluate the effects of the implementation of DPRs' [sic] maximum leach rate regulation for Cu AFPs. The argument that potentially unnecessary and costly actions would be necessary given the 12-year time frame is without merit. . . nor, as described above, is this approach consistent with DPR's expectation that BMPs will be implemented in conjunction with the use of lower leach rate Cu AFPs to meet the CTR criterion of 3.1 µg/L.

(2021 RTC at p. 54.) As reflected in the Background section, DPR initiated studies related to the reduced leach rate CuAFP but stopped the studies due to COVID concerns. The studies are expected to resume within the year in the Summer 2022 and will provided needed data to accurately assess the watershed.

V. Regional Board's CTR and TMDL Analyses are Flawed

We continue to disagree with the Regional Board's incomplete or flawed analyses related both the California Toxics Rule, or CTR, and the TMDL process mandated under federal law. The Regional Board relies on 2016 or older data or 2019 DPR data. (See e.g., July 26, 2021 Regional Board Resp. to May 9-10 2019 Workshop Comments at p. 52; July 21, 2021 Regional Board Resp. to Aug. 2018 Comments at p. 6.) Neither of these provide a ***representative*** characterization of Newport Bay. The 2016 and older data are largely, if not entirely irrelevant, and the 2019 DPR data do not aim to characterize the bay but rather focus on assessing the efficacy of low-leach Cu AFPs. As described below CTR and TMDL regulatory standards demand more rigor.

A. CTR

The Regional Board relies on the CTR to attempt to establish toxicity in the Newport Bay; however, the CTR analysis is incomplete and fails to establish toxicity, particularly in light of evidence brought to the Regional Board's attention that establishes that much of the bay is in compliance with applicable criteria, particularly those areas that receive significant flushing and tidal influence. (See Comment 2 of Chris Miller, City of Newport Beach, and Comment 3 of Dr. Susan Paulsen, May 9-10 2019 Workshop.)

Section 131.38 of title 40 of the Code of Federal Regulations ("C.F.R.") provides criteria and calculations for priority toxic pollutants. EPA listed the criteria and calculations. Subdivision (c)(4) specifically instructs that aquatic life criteria be calculated for metals "from the equations." (See e.g. 40 C.F.R. § 131.38(c)(4).) For example, two criteria listed are maximum and continuous concentrations in water, specifically the criterion maximum concentration ("CMC") and the criterion continuous concentration ("CCC"), and each of these has corresponding calculations. For saltwater, EPA listed a CCC of 3.1 µg/L in the subdivision (b)(1) matrix followed by several calculations that adjust the level to a site-specific standard:

- First, determination of CCC requires a 4-day evaluation; specifically, the CCC "equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. µg/L equals micrograms per liter." (40 C.F.R. §131.38(b)(1), Footnote d.)[3]

- Second, determination of CCC requires a water-effect ratio, or WER; the CCC criteria for these metals are to be "expressed as a function of the water-effect ratio, WER, as defined in paragraph (c) of this section." (40 C.F.R. §131.38(b)(1), footnote "i".) The "water effect ratio is generally computed as a specific pollutant's acute or chronic toxicity value measured in water from the site covered by the standard, divided by the respective acute or chronic toxicity value in laboratory dilution water." (40 C.F.R. § 131.38(c)(4).)

- Third, to "use a water effect ratio other than the default of 1, the WER must be determined as set forth in Interim Guidance on Determination and Use of Water Effect Ratios, U.S. EPA Office of Water, EPA-823-B-94-001, February 1994, or

[3] The criteria continuous concentration, or CCC, is intended to be the highest concentration that could be maintained indefinitely in a water body. USEPA has explained: "[a]s aquatic organisms do not generally experience steady exposure, but rather fluctuating exposures to pollutants, and because ***aquatic organisms can generally tolerate higher concentrations of pollutants over a shorter periods of time***, EPA expects that the concentration of a pollutant can exceed the CCC without causing an unacceptable effect if (a) the magnitude and duration of exceedances are appropriately limited and (b) there are compensating periods of time during which the concentration is below the CCC. ***This is done by specifying a duration of an 'averaging period' over which the average concentration should not exceed the CCC*** more often than specified by the frequency." (65 Fed. Reg. 31682, 31691 (May 18, 2000).

alternatively, other scientifically defensible methods adopted by the State as part of its water quality standards program and approved by EPA."

- Fourth, once WER is calculated "CCC = column B2 or C2 value × WER." (40 C.F.R. §131.38(b)(1), footnote "i".)

- Lastly, footnote "m" specifies "saltwater criteria for metals are expressed in terms of the dissolved fraction of the metal in the water column."

This multi-step calculation is not reflected in the Staff Report or 2021 RTC, and its omission is not trivial.[4] Newport Bay is under tidal influence and flushing, which would by nature alter the levels of copper. If samples are taken on only one day when copper is high, the sample results would be biased high and would misrepresent the condition of the bay entirely. For this reason, CTR requires averaging over four days to avoid such bias results. The TMDL record, however, lacks any evidence showing any 4-day period when the CCC was exceeded sufficient to demonstrate a CTR exceedance. Samples without 4-day average fail to represent the conditions in the bay, violate the express language in the regulation, and skip the necessary evaluation EPA deems necessary – specifically whether "aquatic organisms can generally tolerate higher concentrations of pollutants over a shorter periods of time. . ." (65 Fed. Reg. at p. 31691.) Indeed, as stakeholders have pointed out, much of the bay shows no elevated copper whatsoever and even in areas where elevated copper is detected ***there is no evidence of aquatic toxicity***. (See Comment 3 of Dr. Susan Paulsen, May 9-10 2019 Workshop.)

The Regional Board has also skipped the WER calculation, opting to shift this evaluation upon the stakeholders. Here, the Regional Board must conduct the WER evaluation because without it, the impairment assessment is virtually unsupported. The vast majority of the record points to Newport Bay improving in water quality so much so that even where copper is elevated no aquatic toxicity is found. (Id.) The Regional Board needs the WER assessment to determine once and for all whether there is any relevant, recent, and representative data to support an impairment assessment. Average copper concentration for the harbor is approximately 3.0 µg/L. (See May 9-10, 2019 Workshop Comment 1 of Shelly Anghera, Moffatt and Nichol; also see Att. 6 to City's comment letter submitted concurrently herewith.) Without a WER evaluation, it is not possible to evaluate properly the relevance of the DPR 2019 data, which identified areas where dissolved Cu ranged between 1.49 to 6.02 µg/L.

Now more than a prior times, the improving conditions of Newport Bay make it arbitrary and capricious for the Regional Board not to undertake and complete the CTR evaluation

[4] We recognize that Section 6.1.4.6 of the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (aka State Listing Policy ("SLP") provides that if "sufficient data are not available for the stated averaging period, the available data shall be used to represent the averaging period;" however, the record for the TMDL does not reflect USEPA approval pursuant to the CTR. Section 131.38, described above, mandates adherence to USEPA guidance or approved alternatives. The SLP scope is intended to apply to listing only and not CTR compliance determinations. Reliance on the SLP is misplaced.

properly using the multi-step calculations in the regulation. A correct CTR evaluation is critical given that all other relevant recent data related to the Bay shows a lack of toxicity.

B. TMDL

Water Act Section 303(d), 33 U.S.C. § 1313(d), requires that states identify in priority order impaired waters for which technology-based effluent limitations are not stringent enough to attain and maintain water quality standards. States must then establish TMDLs for the pollutants causing impairment. Here, we see several issues associated with the proposed Copper TMDL that must be addressed.

First, in 2002, USEPA established metal TMDLs pursuant to a 1997 consent decree, and any reliance on this 2002 TMDL presents implementation challenges. We agree that a state is required to incorporate TMDLs along with appropriate implementation measures into the State Water Quality Management Plan (40 CFR 130.6(c)(1), 130.7). We also understand that USEPA has interpreted applicable TMDL regulations to require the state to incorporate EPA's TMDL into the state's implementation plan. (See June 14, 2002 U.S. EPA Region 9 TMDLs at p. 2.) TMDLs, however, are not self-implementing; they must be implemented by the state. *Pronsolino v. Nastri* (9th Cir. 2002) 291 F.3d 1123, 1129 states that "TMDLs are primarily informational tools" that "serve as a link in an implementation chain that includes federally regulated point source controls, state or local plans for point and non-point source pollutant reduction, and assessment of the impact of such measures on water quality, all to the end of attaining water goals for the nation's waters." Given that USEPA's TMDL for copper is not self-implementing and does not include an implementation plan or compliance schedule, the federal TMDL presents implementation challenges that would raise all the same or similar challenges as those presented here.

Second, Section 3.5 of the Staff Report relies on 2014- 2016 impairment listing; however, Section 303(e) of the Clean Water Act, 33 U.S.C. § 1313(e), requires that each state have a "continuing planning process" approved by EPA, to ensure effective TMDL management. States are required to update and resubmit their impaired waters list every two years. At a minimum, we would expect a more recent impairment listing to show the Regional Board's continuing planning process.

Third, states must evaluate "all existing and readily available information" in developing their 303(d) lists (40 C.F.R. §130.7(b) (5)). We believe the technical comments submitted thus far in conjunction with the Copper TMDL reflect concerns about the reliance on out-of-date data, missing data such as the CTR WER and CCC calculations, and critical data that are currently planned for 2022, such as the DPR studies paused last year temporarily due to COVID measures. All of these data are essential for the Regional Board to develop the TMDL properly, if at all.

Fourth, in addition to section 303(d) lists of impaired waters, states are required to submit section 305(b) water quality reports to EPA (due April 1 of even numbered years). Currently, USEPA has asked states to prepare 2022 Integrated Reports ("IRs"), and states are required to provide for public participation in the development of their IRs. Public participation in the upcoming IR report would be enhanced if the Regional Board completes

the studies needed to thoroughly and properly assess whether Newport Bay is an impaired water body or whether the remedial and other voluntary measures the City and others have taken have eliminated the impairment.

VI. Relevant CEQA Law

The California Environmental Quality Act ("CEQA") "compels government first to identify the environmental effects of projects, and then to mitigate those adverse effects through the imposition of feasible mitigation measures or through the selection of feasible alternatives." (*Sierra Club v. State Board of Forestry* (1994) 7 Cal.4th 1215, 1233.) Public agencies, such as the Regional Board, must "refrain from approving projects with significant environmental effects if there are feasible alternatives or mitigation measures that can substantially lessen or avoid those effects." (*City of Arcadia v. State Water Resources Control Board* (2006) 135 Cal.App.4th 1392, 1421 ["Arcadia"] (citing *Mountain Lion Foundation v. Fish & Game Com.* (1997) 16 Cal.4th 105, 134.) "CEQA requires a governmental agency to prepare an EIR whenever it considers approval of a proposed project that '*may* have a *significant* effect on the environment.'" (*Arcadia*, *supra*, (2006) 135 Cal.App.4th 1392, 1421 (citations omitted.) "If there is no substantial evidence a project 'may have a significant effect on the environment' or the initial study identifies potential significant effects, but provides for mitigation revisions which make such effects insignificant, a public agency must adopt a negative declaration to such effect and, as a result, no EIR is required. [Citations.] However, the Supreme Court has recognized that CEQA requires the preparation of an EIR 'whenever it can be fairly argued on the basis of substantial evidence that the project may have significant environmental impact.' [Citations.] Thus, if substantial evidence in the record supports a 'fair argument' significant impacts or effects may occur, an EIR is required and a negative declaration cannot be certified." (*Ibid*.) A "significant effect on the environment" is defined as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment. A social or economic change related to a physical change may be considered in determining whether the physical change is significant." (CEQA Guidelines, § 15382.)

The Water Quality Control (Basin)/Section 208 Planning Program of the State and Regional Water Boards has been certified by the Secretary for Resources, which allows the Regional Board to prepare an SED instead of an Environmental Impact Report ("EIR") or Initial Study/Negative Declaration ("IS/ND") for the Project. "Documents prepared by certified programs are considered the 'functional equivalent' of documents CEQA would otherwise require." (*Arcadia*, *supra*, 135 Cal.App.4th at 1422.) Though exempt from the requirement to prepare an EIR or an Initial Study/ND, "[c]ertified regulatory programs remain subject, however, to other CEQA requirements" including CEQA's "broad policy goals and substantive standards." (*Arcadia*, *supra*, 135 Cal.App.4th at 1421–22.)

The SED must include "at least the following:

1. An analysis of reasonably foreseeable environmental impacts of the methods of compliance;

2. An analysis of reasonably foreseeable feasible mitigation measures relating to those impacts; and

3. An analysis of reasonably foreseeable alternative means of compliance with the rule or regulation, which would avoid or eliminate the identified impacts."

(CEQA, § 21159; CEQA Guidelines, § 15187(c).) In addition, the "environmental analysis shall take into account a reasonable range of environmental, economic, and technical factors, population and geographic areas, and specific sites. *The agency may utilize numerical ranges and averages where specific data is not available*, but is not required to, nor should it, engage in speculation or conjecture." (CEQA Guidelines, § 15187(d) (emphasis added).)

In reviewing the SED, a court will "undertake an equivalent review" of the type of environmental document for which the SED is a substitute. (*California Sportfishing Protection Alliance v. State Water Res. Control Bd.* (2008) 160 Cal.App.4th 1625, 1644.)

The Regional Board's revised SED is greatly improved over previous versions of the SED, which failed to consider the impacts of the reasonably foreseeable implementation measures that would be required for dischargers to meet the Board's proposed Cu TMDL. That said, the SED still does not fully account for these reasonably foreseeable impacts and continues to deflect responsibility for these impacts to the dischargers. Specifically, the revised SED completely fails to consider the human health impacts of introducing perfluorocarbons into the Bay through the use of non-biocide AFPs. The City raised these concerns to the Board in 2018, but, inexplicably, the revised SED still neglects to examine whether the introduction of perfluorocarbons in non-biocide AFPs would have any human health impacts. This is even more puzzling since the Regional Board has been issuing orders related to the investigation of PFAS (which are closely related to perfluorocarbons) and its potential impacts on human health for the last two years. The revised SED should be further amended to examine whether the use of non-biocide AFPs will have human health impacts if such paints are adopted as an alternative to the current Cu AFPs.

In addition, while the SED continually insists that the Regional Board has no responsibility for the potential impacts of the reasonably foreseeable implementation measures under the Water Code, CEQA does not allow an agency to wash its hands of the reasonably foreseeable environmental impacts of an agency's decision. (Pub. Res. Code secs. 21000, 21002, 21002.1, 21003.1, 21005, 21006.) CEQA specifically requires lead agencies to identify mitigation measures for the potential impacts of projects that the agency approves, even if those mitigation measures are ultimately the responsibility of another party. (CEQA Guidelines secs. 15041, 15091, 15126.4.) The revised SED fails as an informational document because the SED insists that the formulation of potential mitigation measures for the Board's proposed implementation measures are the responsibility of the parties devising

the plans to implement the Board's TMDL, and not the Board. However, while the Board may not be able to mandate which implementation measures are chosen for the implementation plans, the Board can, and, indeed, under CEQA has a responsibility to identify the potential mitigation measures to mitigate the impacts of reasonably foreseeable implementation measures, as well as any secondary environmental impacts of those mitigation measures. The revised SED's refusal to do so is a failure to comply with CEQA's requirements and renders the revised SED inadequate under CEQA.

Furthermore, the revised SED still gives short shrift to its analysis of cumulative impacts. Particularly concerning is the fact that the Regional Board is requiring a shift to nonbiocide AFPs, but has still failed to evaluate the cumulative impacts of similar requirements in nearby waterways. As noted previously, it is hardly speculative to envision that boats may travel from nearby San Diego or Los Angeles to Newport Bay. The revised SED should evaluate the potential cumulative impacts of the increased potential for invasive species to be attached to boats in San Diego, Newport, and Los Angeles and to further distribute those invasive species through reasonably foreseeable boat trips between the three destinations.

VII. Conclusion

Because of the numerous legal defects in the most recent Copper TMDL and Implementation plan, it cannot be adopted in its current form.

Sincerely,

Gregory J. Newmark
Attorney at Law

cc: Grace Leung, City of Newport Beach, City Manager (gleung@newportbeachca.gov)
Aaron C. Harp, City of Newport Beach, City Attorney (aharp@newportbeachca.gov)
David Webb, City of Newport Beach, Director of Public Works (DAWebb@newportbeachca.gov).

Encl.
GJN:vlh

3855136

Attachment A to August 27, 2021 Legal Comments on Behalf of City of Newport Beach

moffatt & nichol

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MEMORANDUM

To:	Greg Newmark, Attorney
From:	Shelly Anghera, Ph.D., Moffatt & Nichol
Date:	August 4, 2021
Subject:	Perfluorooctanoic acid (PFOA) and Perfluorobutanesulfonic acid (PFAS) testing of non-biocidal antifouling paints for City of Newport Beach
M&N Job No.:	10429

Introduction

This study was designed to expand previous efforts to review available alternative antifouling paints (AFP) to support discussions on implementation strategies identified in the Revised Newport Bay Copper TMDLs and Non-TMDL Action Plans for Zinc, Mercury, Arsenic, and Chromium. A review of available AFP was conducted developed in August 2018. The review identified only three non-biocidal paints that were recommended as alternatives based on U.S. Environmental Protection Agency (EPA; 2011), California EPA (2011), and Washington Department of Ecology (Ecology; 2014), as shown in **Table 1**. All three paints are designed for commercial vessels. All three paints must be applied by professionals. Even though the paints are recommended alternatives to copper, Ecology (2014) and Northwest Green Chemistry (2017) maintain concerns over hazardous chemicals within the paint that could pose a risk to humans and the marine environment. Many of the paints evaluated do not have full disclosure of ingredients because of the proprietary rights and many of the compounds being used have not been tested for use in marine systems. This study was designed to evaluate the presence of an emerging contaminant of concern, Perfluorooctanoic acid (PFOA) and Perfluorobutanesulfonic acid (PFAS), in the available non-biocidal AFPs.

Table 1. Summary of Available Non-biocidal Paints Recommended in USEPA (2011), California EPA (2011), or Ecology (2014)

Paint	Reference
Hempel (USA), Inc.'s Hempasil X3 (87500)	USEPA 2011
International Paint LLC's Intersleek 900 (currently 1100SR)	USEPA 2011, Ecology 2014
Sher-Release (or FUJIFILM Hunt Smart Surfaces, LLC's Surface Coat Part A-Black)	CalEPA 2011, Ecology 2014

Study Design

Fifteen non-biocidal paints were identified for potential testing based on the results of five studies commissioned by the US EPA, California EPA (CalEPA) Department of Toxic Substances Control, Washington State Department of Ecology (Ecology) and County of Los Angeles Department of Beaches

and Harbors (LA County) to evaluate non-copper-AFP as alternatives to copper-based AFP. Studies included:

- Safer Alternatives to Copper Antifouling Paints for Marine Vessels (USEPA 2011)
- Safer Alternatives to Copper Antifouling Paints: Non-biocidal Paint Options (CalEPA 2011)
- Assessing Alternatives to Copper Antifouling Paint: Piloting the Interstate Chemicals Clearinghouse Alternatives Assessment Guide (CalEPA 2011 and Ecology 2014)
- Washington State Antifouling Boat Paint Alternatives Assessment Report (Northwest Green Chemistry 2017)
- Marina del Rey Pilot Hull Paint Study Final Report (LA County 2019)

Research was completed to determine cost and availability of the paint samples, including review of several online suppliers and calls to local boat yards, a boating supply store and local sales representatives for Ceram-Kote, Hullspeed and Intersleek. A summary of paint availability and cost is below in **Table *2***.

Table 2. Availability and Cost of Potential Paint Samples

Paint	Source	Cost	Unit Size
ePaint EP-21	SMS Distributors	$43.00	quart
CeRam-Kote 54 SST	Local sales representatives for CeRam-Kote and Hullspeed identified in Marina del Rey Hull Paint Study	$125.00	gallon
Hullspeed Smart Armor		$109.00	quart
Hullspeed 3000 Series		$399.00	gallon
Hullspeed F-series		$99.00	quart
Hullspeed Superglide		$129.00	quart
Intersleek	Partial container of 970 available at local boat yard	Not applicable	
Pro-Line 1088	Contacted two boat yards, a boating supply store and reviewed several online suppliers. These products were not readily available.		
Coval Marine and Hull Coat			
CeRam- Kote 99M			
Hempasil x3			
Sea Speed V5 VMT			
Thorn D			
Bottom Speed TC	No information about or references to this product found online.		
VC Performance Epoxy	Non-compliant in California due to VOCs		

Sample Handling and Testing

Four paints were chosen for testing based on availability: ePaint EP-21, CeRam-Kote 54 SST, Hullspeed Smart Armor and Intersleek 970. Of the four Hullspeed paints available, Smart Armor was chosen since it is the line of Hullspeed paint intended for use on recreational boats. The epaint-EP21 was purchased through an online supplier, SMS Distributors, the CeRam-Kote and Hullspeed Paints were purchased through local sales representatives for CeRam-Kote and Hullspeed, and a partial container of Intersleek

970 was obtained from a local boatyard. Paint samples were received at the laboratory on August 20, 2019.

The testing was completed by Eurofins Test America. Eurofins hold UCMR and state accreditations and Department of Defense ELAP certification for polyfluorinated chemical analysis and routinely supports PFAS programs for stakeholders including the Department of Defense, the EPA, state agencies and commercial manufacturers. The paints were dropped off at the Eurofins TestAmerica facility in Irvine, submitted under chain-of-custody, and shipped to the Sacramento TestAmerica facility for analysis. The ePaint, CeRam-Kote and Hullspeed paints were submitted to the lab in sealed, unopened containers. The Intersleek sample was a partial sample and was submitted as received, in a previously opened 5-gallon container.

The samples were analyzed using a modified EPA Method 537 for testing non-drinking water matrices and EPA Method 3535. The samples were diluted to testable levels prior to analysis.

Testing Results

Results of the analyses are given below in **Table 3**. Initial analyses completed for Perfluorooctanoic acid (PFOA) and Perfluorobutanesulfonic acid (PFBS) indicated elevated levels, and samples for those compounds were re-extracted outside the recommended holding time due to backlog at the laboratory. However, paint in closed containers is not anticipated to change with holding time. The holding time flag is more appropriate for environmental samples.

As a result of the dilution level, the detection limit was very high and most of the results were non-detect (ND). Of the four paints tested, three contained high levels of Perfluoroalkyl and Polyfluoroalkyl Substances (PFASs). Only CeRam-Kote 54 SST did not have detectable concentrations greater than 400 ng/L- 50,000 ng/L for specific PFAS products. PFAS chemicals may have been present at concentrations below the detection limit.

Table 3. PFAS Testing Results

	CeRam-Kote 54 SST A 08/15/19	Intersleek 970 08/15/19	ePaint EP-21 08/15/19	Hullspeed Smart Armor A 08/15/19
4:2 FTS (ng/L)	13000 U	13000 U	13000 U	130000 U
6:2 FTS (ng/L)	5000 U	**6000 J**	5000 U	**62000 J**
8:2 FTS (ng/L)	5000 U	5000 U	5000 U	50000 U
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA) (ng/L)	4800 U	4800 U	4800 U	48000 U
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA) (ng/L)	7800 U	7800 U	7800 U	78000 U
Perfluorobutanesulfonic acid (PFBS) (ng/L)	5000 U H	5000 U H	5000 U H	5000 U H
Perfluorobutanoic acid (PFBA) (ng/L)	880 U	880 U	880 U	8800 U
Perfluorodecanesulfonic acid (PFDS) (ng/L)	800 U	800 U	800 U	8000 U
Perfluorodecanoic acid (PFDA) (ng/L)	780 U	780 U	780 U	7800 U
Perfluorododecanoic acid (PFDoA) (ng/L)	1400 U	1400 U	1400 U	**28000 J I**
Perfluoroheptanesulfonic Acid (PFHpS) (ng/L)	480 U	480 U	480 U	4800 U
Perfluoroheptanoic acid (PFHpA) (ng/L)	630 U	630 U	630 U	6300 U
Perfluorohexanesulfonic acid (PFHxS) (ng/L)	430 U	**690 J**	430 U	**8900 J**
Perfluorohexanoic acid (PFHxA) (ng/L)	1500 U	1500 U	1500 U	15000 U
Perfluorononanesulfonic acid (PFNS) (ng/L)	400 U	400 U	400 U	4000 U
Perfluorononanoic acid (PFNA) (ng/L)	680 U	680 U	680 U	6800 U
Perfluorooctanesulfonamide (FOSA) (ng/L)	880 U	880 U	880 U	8800 U
Perfluorooctanesulfonic acid (PFOS) (ng/L)	1400 U	1400 U	1400 U	14000 U
Perfluorooctanoic acid (PFOA) (ng/L)	21000 U H	21000 U H	**23000 J H I**	21000 U H
Perfluoropentanesulfonic acid (PFPeS) (ng/L)	750 U	750 U	750 U	7500 U
Perfluoropentanoic acid (PFPeA) (ng/L)	1200 U	1200 U	1200 U	12000 U
Perfluorotetradecanoic acid (PFTeA) (ng/L)	730 U	730 U	730 U	7300 U
Perfluorotridecanoic acid (PFTriA) (ng/L)	3300 U	3300 U	3300 U	33000 U
Perfluoroundecanoic acid (PFUnA) (ng/L)	2800 U	2800 U	2800 U	28000 U

Notes:

Bold Detected result

\- No criteria/Not measured

H Sample was prepped or analyzed beyond the specified holding time

I Value is EMPC (estimated maximum possible concentration).

J Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

U Not Detected at the reporting limit (or MDL or EDL if shown)

References

California Environmental Protection Agency. 2011. *Safer Alternatives to Copper Antifouling Paints: Nonbiocide Paint Options*. Prepared for Cal/EPA's Department of Toxic Substances Control and U.S. Environmental Protection Agency Region IX. Prepared by Katy Wolf, Institute for Research and Technical Assistance. February 2011. Available from http://www.dtsc.ca.gov/PollutionPrevention/upload/DTSCboatfinalrept1.pdf

Northwest Green Chemistry. 2017. Washington State Antifouling Boat Paint Alternatives Assessment Report. October. Prepared with TechLaw, Inc. Available from: https://www.northwestgreenchemistry.org/event/fourth-stakeholders-call-wa-state-antifouling-boat-paint-aa

U.S. Environmental Protection Agency, 2011. Safer Alternatives to Copper Antifouling Paints for Marine Vessels – Final Report. Project NP00946501-4. January 2011.

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eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

Laboratory Job ID: 320-53433-1
Client Project/Site: PFAS testing

For:
Moffatt & Nichol
630 Grand Avenue
Suite D
Carlsbad, California 92008

Attn: Emily Beck

Authorized for release by:
10/21/2019 12:16:45 PM
Jill Kellmann, Manager of Project Management
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Designee for

Karen Dahl, Senior Project Manager
(916)374-4384
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Table of Contents

Definitions/Glossary

Client: Moffatt & Nichol
Project/Site: PFAS testing

Job ID: 320-53433-1

Qualifiers

LCMS

Qualifier	Qualifier Description
*	Isotope Dilution analyte is outside acceptance limits.
H	Sample was prepped or analyzed beyond the specified holding time
I	Value is EMPC (estimated maximum possible concentration).
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 320-53433-1

Laboratory: Eurofins TestAmerica, Sacramento

Narrative

internal note to PM: don't invoice until we know how much the return shipping of the paints will cost

Receipt

The samples were received on 8/20/2019 10:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 18.3º C and 20.1º C.

Receipt Exceptions

The Chain-of-Custody (COC) was incomplete as received and/or improperly completed. The COC was not relinquished to the laboratory.

LCMS

Methods 537 (modified): Due to a shortage in the marketplace for 13C3-PFBS, the target analyte PFBS and/or Perfluoropentanesulfonic acid (PFPeS) could not be quantitated against 13C3-PFBS (its labeled variant) as listed in the SOP. PFBS and Perfluoropentanesulfonic acid (PFPeS) was quantitated versus 18O2-PFHxS instead.

Method 537 (modified): Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for several IDA in the following samples: EP-21 (320-53433-1), Smart Armor A (320-53433-2) and 54 SST A (320-53433-3). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

Method 537 (modified): Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for M2-6:2 FTS and M2-8:2 FTS in the following sample: 970 (320-53433-4). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

Method 537 (modified): The “I” qualifier means the transition mass ratio for the indicated analyte was outside of the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty. However, analyst judgement was used to positively identify the analyte. EP-21 (320-53433-1), Smart Armor A (320-53433-2)

Method 537 (modified): The samples in extraction batch 320-319569 were found to have elevated levels of Perfluorooctanoic acid (PFOA) Perfluorobutanesulfonic acid (PFBS). The samples were re-extracted in batch 320-331567 outside the recommended hold time. The out of hold data is reported for these compounds as the initial data is not useful for it's intended purpose. EP-21 (320-53433-1), Smart Armor A (320-53433-2), 54 SST A (320-53433-3), 970 (320-53433-4), (LCS 320-319569/2-A), (LCSD 320-319569/3-A) and (MB 320-319569/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep

Method 3535: Due to the matrix, the initial volumes used for the following samples deviated from the standard procedure: EP-21 (320-53433-1), Smart Armor A (320-53433-2), 54 SST A (320-53433-3) and 970 (320-53433-4). The reporting limits (RLs) have been adjusted proportionately.

Method 3535: The following samples appeared to be turbid follwoing elution: Smart Armor A (320-53433-2) and 54 SST A (320-53433-3).

Method 3535: The following sample appeared to be light yellow in color following elution: EP-21 (320-53433-1).

Method 3535: The following sample appeared to be a milky color following elution: 54 SST A (320-53433-3).

Method 3535: The following samples were re-prepared outside of preparation holding time due to elevated levels in the MB/LCS/LCSD: EP-21 (320-53433-1), Smart Armor A (320-53433-2), 54 SST A (320-53433-3) and 970 (320-53433-4).

Method 3535: Due to the matrix, the initial volumes used for the following samples deviated from the standard procedure: EP-21 (320-53433-1), Smart Armor A (320-53433-2), 54 SST A (320-53433-3) and 970 (320-53433-4). The reporting limits (RLs) have been adjusted proportionately.

Method 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-331567.

Job ID: 320-53433-1 (Continued)

Laboratory: Eurofins TestAmerica, Sacramento (Continued)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Moffatt & Nichol
Project/Site: PFAS testing

Job ID: 320-53433-1

Client Sample ID: EP-21 — Lab Sample ID: 320-53433-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA) - RE	23000	J H I	50000	21000	ng/L	1		537 (modified)	Total/NA

Client Sample ID: Smart Armor A — Lab Sample ID: 320-53433-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorododecanoic acid (PFDoA)	28000	J I	50000	14000	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	8900	J	50000	4300	ng/L	1		537 (modified)	Total/NA
6:2 FTS	62000	J	500000	50000	ng/L	1		537 (modified)	Total/NA

Client Sample ID: 54 SST A — Lab Sample ID: 320-53433-3

No Detections.

Client Sample ID: 970 — Lab Sample ID: 320-53433-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	690	J	5000	430	ng/L	1		537 (modified)	Total/NA
6:2 FTS	6000	J	50000	5000	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: EP-21
Date Collected: 08/15/19 00:00
Date Received: 08/20/19 10:00

Lab Sample ID: 320-53433-1
Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND		5000	880	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluoropentanoic acid (PFPeA)	ND		5000	1200	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluorohexanoic acid (PFHxA)	ND		5000	1500	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluoroheptanoic acid (PFHpA)	ND		5000	630	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluorononanoic acid (PFNA)	ND		5000	680	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluorodecanoic acid (PFDA)	ND		5000	780	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluoroundecanoic acid (PFUnA)	ND		5000	2800	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluorododecanoic acid (PFDoA)	ND		5000	1400	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluorotridecanoic acid (PFTriA)	ND		5000	3300	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluorotetradecanoic acid (PFTeA)	ND		5000	730	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluoropentanesulfonic acid (PFPeS)	ND		5000	750	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluorohexanesulfonic acid (PFHxS)	ND		5000	430	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		5000	480	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluorooctanesulfonic acid (PFOS)	ND		5000	1400	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluorononanesulfonic acid (PFNS)	ND		5000	400	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluorodecanesulfonic acid (PFDS)	ND		5000	800	ng/L		08/29/19 18:46	09/03/19 12:28	1
Perfluorooctanesulfonamide (FOSA)	ND		5000	880	ng/L		08/29/19 18:46	09/03/19 12:28	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		50000	7800	ng/L		08/29/19 18:46	09/03/19 12:28	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		50000	4800	ng/L		08/29/19 18:46	09/03/19 12:28	1
4:2 FTS	ND		50000	13000	ng/L		08/29/19 18:46	09/03/19 12:28	1
6:2 FTS	ND		50000	5000	ng/L		08/29/19 18:46	09/03/19 12:28	1
8:2 FTS	ND		50000	5000	ng/L		08/29/19 18:46	09/03/19 12:28	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*105*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
13C5 PFPeA	*70*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
13C2 PFHxA	*84*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
13C4 PFHpA	*103*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
13C5 PFNA	*91*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
13C2 PFDA	*120*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
13C2 PFUnA	*112*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
13C2 PFDoA	*123*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
13C2 PFTeDA	*89*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
18O2 PFHxS	*112*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
13C4 PFOS	*94*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
13C8 FOSA	*74*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
d3-NMeFOSAA	*161*	*	*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
d5-NEtFOSAA	*156*	*	*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
M2-6:2 FTS	*238*	*	*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
M2-8:2 FTS	*272*	*	*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*
M2-4:2 FTS	*168*	*	*25 - 150*	*08/29/19 18:46*	*09/03/19 12:28*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - RE

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	**23000**	**J H I**	50000	21000	ng/L		10/16/19 21:12	10/17/19 12:34	1
Perfluorobutanesulfonic acid (PFBS)	ND	H	50000	5000	ng/L		10/16/19 21:12	10/17/19 12:34	1

Client Sample ID: EP-21

Lab Sample ID: 320-53433-1

Date Collected: 08/15/19 00:00

Matrix: Water

Date Received: 08/20/19 10:00

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA	104		25 - 150	10/16/19 21:12	10/17/19 12:34	1
18O2 PFHxS	107		25 - 150	10/16/19 21:12	10/17/19 12:34	1

Client Sample ID: Smart Armor A

Lab Sample ID: 320-53433-2

Date Collected: 08/15/19 00:00

Matrix: Water

Date Received: 08/20/19 10:00

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND		50000	8800	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluoropentanoic acid (PFPeA)	ND		50000	12000	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluorohexanoic acid (PFHxA)	ND		50000	15000	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluoroheptanoic acid (PFHpA)	ND		50000	6300	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluorononanoic acid (PFNA)	ND		50000	6800	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluorodecanoic acid (PFDA)	ND		50000	7800	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluoroundecanoic acid (PFUnA)	ND		50000	28000	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluorododecanoic acid (PFDoA)	**28000**	**J I**	50000	14000	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluorotridecanoic acid (PFTriA)	ND		50000	33000	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluorotetradecanoic acid (PFTeA)	ND		50000	7300	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluoropentanesulfonic acid (PFPeS)	ND		50000	7500	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluorohexanesulfonic acid (PFHxS)	**8900**	**J**	50000	4300	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		50000	4800	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluorooctanesulfonic acid (PFOS)	ND		50000	14000	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluorononanesulfonic acid (PFNS)	ND		50000	4000	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluorodecanesulfonic acid (PFDS)	ND		50000	8000	ng/L		08/29/19 18:46	09/03/19 12:36	1
Perfluorooctanesulfonamide (FOSA)	ND		50000	8800	ng/L		08/29/19 18:46	09/03/19 12:36	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		500000	78000	ng/L		08/29/19 18:46	09/03/19 12:36	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		500000	48000	ng/L		08/29/19 18:46	09/03/19 12:36	1
4:2 FTS	ND		500000	130000	ng/L		08/29/19 18:46	09/03/19 12:36	1
6:2 FTS	**62000**	**J**	500000	50000	ng/L		08/29/19 18:46	09/03/19 12:36	1
8:2 FTS	ND		500000	50000	ng/L		08/29/19 18:46	09/03/19 12:36	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFBA	66		25 - 150	08/29/19 18:46	09/03/19 12:36	1
13C5 PFPeA	79		25 - 150	08/29/19 18:46	09/03/19 12:36	1
13C2 PFHxA	89		25 - 150	08/29/19 18:46	09/03/19 12:36	1
13C4 PFHpA	94		25 - 150	08/29/19 18:46	09/03/19 12:36	1
13C5 PFNA	98		25 - 150	08/29/19 18:46	09/03/19 12:36	1
13C2 PFDA	105		25 - 150	08/29/19 18:46	09/03/19 12:36	1
13C2 PFUnA	111		25 - 150	08/29/19 18:46	09/03/19 12:36	1
13C2 PFDoA	106		25 - 150	08/29/19 18:46	09/03/19 12:36	1
13C2 PFTeDA	89		25 - 150	08/29/19 18:46	09/03/19 12:36	1
18O2 PFHxS	91		25 - 150	08/29/19 18:46	09/03/19 12:36	1
13C4 PFOS	86		25 - 150	08/29/19 18:46	09/03/19 12:36	1
13C8 FOSA	88		25 - 150	08/29/19 18:46	09/03/19 12:36	1
d3-NMeFOSAA	147		25 - 150	08/29/19 18:46	09/03/19 12:36	1
d5-NEtFOSAA	199	*	25 - 150	08/29/19 18:46	09/03/19 12:36	1

Client Sample ID: Smart Armor A

Lab Sample ID: 320-53433-2

Date Collected: 08/15/19 00:00

Matrix: Water

Date Received: 08/20/19 10:00

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
M2-6:2 FTS	157	*	25 - 150	08/29/19 18:46	09/03/19 12:36	1
M2-8:2 FTS	315	*	25 - 150	08/29/19 18:46	09/03/19 12:36	1
M2-4:2 FTS	116		25 - 150	08/29/19 18:46	09/03/19 12:36	1

Method: 537 (modified) - Fluorinated Alkyl Substances - RE

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND	H	50000	21000	ng/L		10/16/19 21:12	10/17/19 12:44	1
Perfluorobutanesulfonic acid (PFBS)	ND	H	50000	5000	ng/L		10/16/19 21:12	10/17/19 12:44	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA	72		25 - 150	10/16/19 21:12	10/17/19 12:44	1
18O2 PFHxS	71		25 - 150	10/16/19 21:12	10/17/19 12:44	1

Client Sample ID: 54 SST A

Lab Sample ID: 320-53433-3

Date Collected: 08/15/19 00:00

Matrix: Water

Date Received: 08/20/19 10:00

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND		5000	880	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluoropentanoic acid (PFPeA)	ND		5000	1200	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluorohexanoic acid (PFHxA)	ND		5000	1500	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluoroheptanoic acid (PFHpA)	ND		5000	630	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluorononanoic acid (PFNA)	ND		5000	680	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluorodecanoic acid (PFDA)	ND		5000	780	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluoroundecanoic acid (PFUnA)	ND		5000	2800	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluorododecanoic acid (PFDoA)	ND		5000	1400	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluorotridecanoic acid (PFTriA)	ND		5000	3300	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluorotetradecanoic acid (PFTeA)	ND		5000	730	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluoropentanesulfonic acid (PFPeS)	ND		5000	750	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluorohexanesulfonic acid (PFHxS)	ND		5000	430	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		5000	480	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluorooctanesulfonic acid (PFOS)	ND		5000	1400	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluorononanesulfonic acid (PFNS)	ND		5000	400	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluorodecanesulfonic acid (PFDS)	ND		5000	800	ng/L		08/29/19 18:46	09/03/19 12:45	1
Perfluorooctanesulfonamide (FOSA)	ND		5000	880	ng/L		08/29/19 18:46	09/03/19 12:45	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		50000	7800	ng/L		08/29/19 18:46	09/03/19 12:45	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		50000	4800	ng/L		08/29/19 18:46	09/03/19 12:45	1
4:2 FTS	ND		50000	13000	ng/L		08/29/19 18:46	09/03/19 12:45	1
6:2 FTS	ND		50000	5000	ng/L		08/29/19 18:46	09/03/19 12:45	1
8:2 FTS	ND		50000	5000	ng/L		08/29/19 18:46	09/03/19 12:45	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFBA	105		25 - 150	08/29/19 18:46	09/03/19 12:45	1
13C5 PFPeA	94		25 - 150	08/29/19 18:46	09/03/19 12:45	1
13C2 PFHxA	97		25 - 150	08/29/19 18:46	09/03/19 12:45	1
13C4 PFHpA	86		25 - 150	08/29/19 18:46	09/03/19 12:45	1
13C5 PFNA	60		25 - 150	08/29/19 18:46	09/03/19 12:45	1
13C2 PFDA	70		25 - 150	08/29/19 18:46	09/03/19 12:45	1

Client Sample ID: 54 SST A

Date Collected: 08/15/19 00:00
Date Received: 08/20/19 10:00

Lab Sample ID: 320-53433-3

Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFUnA	*61*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:45*	*1*
13C2 PFDoA	*44*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:45*	*1*
13C2 PFTeDA	*39*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:45*	*1*
18O2 PFHxS	*62*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:45*	*1*
13C4 PFOS	*37*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:45*	*1*
13C8 FOSA	*56*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:45*	*1*
d3-NMeFOSAA	*82*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:45*	*1*
d5-NEtFOSAA	*106*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:45*	*1*
M2-6:2 FTS	*247*	*	*25 - 150*	*08/29/19 18:46*	*09/03/19 12:45*	*1*
M2-8:2 FTS	*228*	*	*25 - 150*	*08/29/19 18:46*	*09/03/19 12:45*	*1*
M2-4:2 FTS	*178*	*	*25 - 150*	*08/29/19 18:46*	*09/03/19 12:45*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - RE

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND	H	50000	21000	ng/L		10/16/19 21:12	10/17/19 13:32	1
Perfluorobutanesulfonic acid (PFBS)	ND	H	50000	5000	ng/L		10/16/19 21:12	10/17/19 13:32	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*102*		*25 - 150*	*10/16/19 21:12*	*10/17/19 13:32*	*1*
18O2 PFHxS	*100*		*25 - 150*	*10/16/19 21:12*	*10/17/19 13:32*	*1*

Client Sample ID: 970

Date Collected: 08/15/19 00:00
Date Received: 08/22/19 09:15

Lab Sample ID: 320-53433-4

Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND		5000	880	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluoropentanoic acid (PFPeA)	ND		5000	1200	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluorohexanoic acid (PFHxA)	ND		5000	1500	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluoroheptanoic acid (PFHpA)	ND		5000	630	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluorononanoic acid (PFNA)	ND		5000	680	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluorodecanoic acid (PFDA)	ND		5000	780	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluoroundecanoic acid (PFUnA)	ND		5000	2800	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluorododecanoic acid (PFDoA)	ND		5000	1400	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluorotridecanoic acid (PFTriA)	ND		5000	3300	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluorotetradecanoic acid (PFTeA)	ND		5000	730	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluoropentanesulfonic acid (PFPeS)	ND		5000	750	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluorohexanesulfonic acid (PFHxS)	**690**	**J**	5000	430	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		5000	480	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluorooctanesulfonic acid (PFOS)	ND		5000	1400	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluorononanesulfonic acid (PFNS)	ND		5000	400	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluorodecanesulfonic acid (PFDS)	ND		5000	800	ng/L		08/29/19 18:46	09/03/19 12:53	1
Perfluorooctanesulfonamide (FOSA)	ND		5000	880	ng/L		08/29/19 18:46	09/03/19 12:53	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		50000	7800	ng/L		08/29/19 18:46	09/03/19 12:53	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		50000	4800	ng/L		08/29/19 18:46	09/03/19 12:53	1
4:2 FTS	ND		50000	13000	ng/L		08/29/19 18:46	09/03/19 12:53	1

Client: Moffatt & Nichol
Project/Site: PFAS testing

Job ID: 320-53433-1

Client Sample ID: 970
Date Collected: 08/15/19 00:00
Date Received: 08/22/19 09:15

Lab Sample ID: 320-53433-4
Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
6:2 FTS	6000	J	50000	5000	ng/L		08/29/19 18:46	09/03/19 12:53	1
8:2 FTS	ND		50000	5000	ng/L		08/29/19 18:46	09/03/19 12:53	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*102*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
13C5 PFPeA	*93*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
13C2 PFHxA	*103*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
13C4 PFHpA	*109*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
13C5 PFNA	*105*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
13C2 PFDA	*105*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
13C2 PFUnA	*96*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
13C2 PFDoA	*97*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
13C2 PFTeDA	*52*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
18O2 PFHxS	*111*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
13C4 PFOS	*91*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
13C8 FOSA	*80*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
d3-NMeFOSAA	*111*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
d5-NEtFOSAA	*99*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
M2-6:2 FTS	*167*	*	*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
M2-8:2 FTS	*182*	*	*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*
M2-4:2 FTS	*150*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:53*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - RE

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND	H	50000	21000	ng/L		10/16/19 21:12	10/17/19 13:42	1
Perfluorobutanesulfonic acid (PFBS)	ND	H	50000	5000	ng/L		10/16/19 21:12	10/17/19 13:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOA	*114*		*25 - 150*	*10/16/19 21:12*	*10/17/19 13:42*	*1*
18O2 PFHxS	*116*		*25 - 150*	*10/16/19 21:12*	*10/17/19 13:42*	*1*

Isotope Dilution Summary

Client: Moffatt & Nichol
Project/Site: PFAS testing

Job ID: 320-53433-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Water **Prep Type: Total/NA**

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFBA (25-150)	PFPeA (25-150)	PFHxA (25-150)	PFHpA (25-150)	PFNA (25-150)	PFDA (25-150)	PFUnA (25-150)	PFDoA (25-150)
320-53433-1	EP-21	105	70	84	103	91	120	112	123
320-53433-2	Smart Armor A	66	79	89	94	98	105	111	106
320-53433-3	54 SST A	105	94	97	86	60	70	61	44
320-53433-4	970	102	93	103	109	105	105	96	97
LCS 320-319569/2-A	Lab Control Sample	103	89	103	109	103	111	109	113
LCSD 320-319569/3-A	Lab Control Sample Dup	105	93	106	110	108	114	114	122
MB 320-319569/1-A	Method Blank	102	87	100	103	106	112	106	116

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFTDA (25-150)	PFHxS (25-150)	PFOS (25-150)	PFOSA (25-150)	-NMeFOS/ (25-150)	-NEtFOS/ (25-150)	M262FTS (25-150)	M282FTS (25-150)
320-53433-1	EP-21	89	112	94	74	161 *	156 *	238 *	272 *
320-53433-2	Smart Armor A	89	91	86	88	147	199 *	157 *	315 *
320-53433-3	54 SST A	39	62	37	56	82	106	247 *	228 *
320-53433-4	970	52	111	91	80	111	99	167 *	182 *
LCS 320-319569/2-A	Lab Control Sample	120	103	98	97	103	109	95	104
LCSD 320-319569/3-A	Lab Control Sample Dup	108	109	99	100	109	111	92	116
MB 320-319569/1-A	Method Blank	113	108	101	101	104	116	98	103

		Percent Isotope Dilution Recovery (Acceptance Limits)
Lab Sample ID	Client Sample ID	M242FTS (25-150)
320-53433-1	EP-21	168 *
320-53433-2	Smart Armor A	116
320-53433-3	54 SST A	178 *
320-53433-4	970	150
LCS 320-319569/2-A	Lab Control Sample	72
LCSD 320-319569/3-A	Lab Control Sample Dup	73
MB 320-319569/1-A	Method Blank	75

Surrogate Legend

PFBA = 13C4 PFBA
PFPeA = 13C5 PFPeA
PFHxA = 13C2 PFHxA
PFHpA = 13C4 PFHpA
PFNA = 13C5 PFNA
PFDA = 13C2 PFDA
PFUnA = 13C2 PFUnA
PFDoA = 13C2 PFDoA
PFTDA = 13C2 PFTeDA
PFHxS = 18O2 PFHxS
PFOS = 13C4 PFOS
PFOSA = 13C8 FOSA
d3-NMeFOSAA = d3-NMeFOSAA
d5-NEtFOSAA = d5-NEtFOSAA
M262FTS = M2-6:2 FTS
M282FTS = M2-8:2 FTS
M242FTS = M2-4:2 FTS

Isotope Dilution Summary

Client: Moffatt & Nichol
Project/Site: PFAS testing

Job ID: 320-53433-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)									
Lab Sample ID	Client Sample ID	PFOA (25-150)	PFHxS (25-150)								
320-53433-1 - RE	EP-21	104	107								
320-53433-2 - RE	Smart Armor A	72	71								
320-53433-3 - RE	54 SST A	102	100								
320-53433-4 - RE	970	114	116								
LCS 320-331567/2-A	Lab Control Sample	103	108								
LCSD 320-331567/3-A	Lab Control Sample Dup	106	113								
MB 320-331567/1-A	Method Blank	102	107								

Surrogate Legend

PFOA = 13C4 PFOA
PFHxS = 18O2 PFHxS

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-319569/1-A
Matrix: Water
Analysis Batch: 320130

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 319569

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND		2.0	0.35	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluoropentanoic acid (PFPeA)	ND		2.0	0.49	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.58	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.25	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.31	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	1.1	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.55	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	1.3	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.29	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluoropentanesulfonic acid (PFPeS)	ND		2.0	0.30	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.17	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.19	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.54	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluorononanesulfonic acid (PFNS)	ND		2.0	0.16	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.32	ng/L		08/29/19 18:46	09/03/19 12:04	1
Perfluorooctanesulfonamide (FOSA)	ND		2.0	0.35	ng/L		08/29/19 18:46	09/03/19 12:04	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		20	3.1	ng/L		08/29/19 18:46	09/03/19 12:04	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		20	1.9	ng/L		08/29/19 18:46	09/03/19 12:04	1
4:2 FTS	ND		20	5.2	ng/L		08/29/19 18:46	09/03/19 12:04	1
6:2 FTS	ND		20	2.0	ng/L		08/29/19 18:46	09/03/19 12:04	1
8:2 FTS	ND		20	2.0	ng/L		08/29/19 18:46	09/03/19 12:04	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*102*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
13C5 PFPeA	*87*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
13C2 PFHxA	*100*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
13C4 PFHpA	*103*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
13C5 PFNA	*106*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
13C2 PFDA	*112*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
13C2 PFUnA	*106*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
13C2 PFDoA	*116*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
13C2 PFTeDA	*113*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
18O2 PFHxS	*108*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
13C4 PFOS	*101*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
13C8 FOSA	*101*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
d3-NMeFOSAA	*104*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
d5-NEtFOSAA	*116*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
M2-6:2 FTS	*98*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
M2-8:2 FTS	*103*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*
M2-4:2 FTS	*75*		*25 - 150*	*08/29/19 18:46*	*09/03/19 12:04*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-319569/2-A
Matrix: Water
Analysis Batch: 320130

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 319569

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanoic acid (PFBA)	40.0	41.3		ng/L		103	70 - 130
Perfluoropentanoic acid (PFPeA)	40.0	40.2		ng/L		100	66 - 126
Perfluorohexanoic acid (PFHxA)	40.0	40.0		ng/L		100	66 - 126
Perfluoroheptanoic acid (PFHpA)	40.0	39.6		ng/L		99	66 - 126
Perfluorononanoic acid (PFNA)	40.0	42.6		ng/L		106	68 - 128
Perfluorodecanoic acid (PFDA)	40.0	43.9		ng/L		110	69 - 129
Perfluoroundecanoic acid (PFUnA)	40.0	38.5		ng/L		96	60 - 120
Perfluorododecanoic acid (PFDoA)	40.0	40.3		ng/L		101	71 - 131
Perfluorotridecanoic acid (PFTriA)	40.0	38.5		ng/L		96	72 - 132
Perfluorotetradecanoic acid (PFTeA)	40.0	39.4		ng/L		99	68 - 128
Perfluoropentanesulfonic acid (PFPeS)	37.5	38.2		ng/L		102	70 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.4	35.2		ng/L		97	63 - 123
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	41.7		ng/L		110	68 - 128
Perfluorooctanesulfonic acid (PFOS)	37.1	38.4		ng/L		103	67 - 127
Perfluorononanesulfonic acid (PFNS)	38.4	41.7		ng/L		109	70 - 130
Perfluorodecanesulfonic acid (PFDS)	38.6	40.9		ng/L		106	68 - 128
Perfluorooctanesulfonamide (FOSA)	40.0	42.2		ng/L		105	70 - 130
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	42.1		ng/L		105	67 - 127
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	38.1		ng/L		95	65 - 125
4:2 FTS	37.4	41.3		ng/L		110	70 - 130
6:2 FTS	37.9	42.1		ng/L		111	66 - 126
8:2 FTS	38.3	38.4		ng/L		100	67 - 127

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C4 PFBA	*103*		*25 - 150*
13C5 PFPeA	*89*		*25 - 150*
13C2 PFHxA	*103*		*25 - 150*
13C4 PFHpA	*109*		*25 - 150*
13C5 PFNA	*103*		*25 - 150*
13C2 PFDA	*111*		*25 - 150*
13C2 PFUnA	*109*		*25 - 150*
13C2 PFDoA	*113*		*25 - 150*
13C2 PFTeDA	*120*		*25 - 150*
18O2 PFHxS	*103*		*25 - 150*
13C4 PFOS	*98*		*25 - 150*
13C8 FOSA	*97*		*25 - 150*
d3-NMeFOSAA	*103*		*25 - 150*
d5-NEtFOSAA	*109*		*25 - 150*
M2-6:2 FTS	*95*		*25 - 150*

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-319569/2-A
Matrix: Water
Analysis Batch: 320130

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 319569

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
M2-8:2 FTS	*104*		*25 - 150*
M2-4:2 FTS	*72*		*25 - 150*

Lab Sample ID: LCSD 320-319569/3-A
Matrix: Water
Analysis Batch: 320130

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 319569

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanoic acid (PFBA)			40.0	41.9		ng/L		105	70 - 130	2	30
Perfluoropentanoic acid (PFPeA)			40.0	41.3		ng/L		103	66 - 126	3	30
Perfluorohexanoic acid (PFHxA)			40.0	41.2		ng/L		103	66 - 126	3	30
Perfluoroheptanoic acid (PFHpA)			40.0	42.1		ng/L		105	66 - 126	6	30
Perfluorononanoic acid (PFNA)			40.0	42.7		ng/L		107	68 - 128	0	30
Perfluorodecanoic acid (PFDA)			40.0	43.8		ng/L		109	69 - 129	0	30
Perfluoroundecanoic acid (PFUnA)			40.0	39.5		ng/L		99	60 - 120	3	30
Perfluorododecanoic acid (PFDoA)			40.0	41.9		ng/L		105	71 - 131	4	30
Perfluorotridecanoic acid (PFTriA)			40.0	41.6		ng/L		104	72 - 132	8	30
Perfluorotetradecanoic acid (PFTeA)			40.0	39.7		ng/L		99	68 - 128	1	30
Perfluoropentanesulfonic acid (PFPeS)			37.5	39.3		ng/L		105	70 - 130	3	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	34.2		ng/L		94	63 - 123	3	30
Perfluoroheptanesulfonic Acid (PFHpS)			38.1	44.0		ng/L		116	68 - 128	5	30
Perfluorooctanesulfonic acid (PFOS)			37.1	38.9		ng/L		105	67 - 127	1	30
Perfluorononanesulfonic acid (PFNS)			38.4	44.1		ng/L		115	70 - 130	6	30
Perfluorodecanesulfonic acid (PFDS)			38.6	43.4		ng/L		112	68 - 128	6	30
Perfluorooctanesulfonamide (FOSA)			40.0	42.6		ng/L		107	70 - 130	1	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	41.8		ng/L		104	67 - 127	1	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	41.0		ng/L		103	65 - 125	7	30
4:2 FTS			37.4	46.1		ng/L		123	70 - 130	11	30
6:2 FTS			37.9	46.4		ng/L		122	66 - 126	10	30
8:2 FTS			38.3	40.5		ng/L		106	67 - 127	5	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C4 PFBA	*105*		*25 - 150*
13C5 PFPeA	*93*		*25 - 150*
13C2 PFHxA	*106*		*25 - 150*
13C4 PFHpA	*110*		*25 - 150*
13C5 PFNA	*108*		*25 - 150*
13C2 PFDA	*114*		*25 - 150*
13C2 PFUnA	*114*		*25 - 150*

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 320-319569/3-A
Matrix: Water
Analysis Batch: 320130

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 319569

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C2 PFDoA	122		25 - 150
13C2 PFTeDA	108		25 - 150
18O2 PFHxS	109		25 - 150
13C4 PFOS	99		25 - 150
13C8 FOSA	100		25 - 150
d3-NMeFOSAA	109		25 - 150
d5-NEtFOSAA	111		25 - 150
M2-6:2 FTS	92		25 - 150
M2-8:2 FTS	116		25 - 150
M2-4:2 FTS	73		25 - 150

Lab Sample ID: MB 320-331567/1-A
Matrix: Water
Analysis Batch: 331659

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 331567

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	ND		2.0	0.85	ng/L		10/16/19 21:12	10/17/19 11:08	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.20	ng/L		10/16/19 21:12	10/17/19 11:08	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA	102		25 - 150	10/16/19 21:12	10/17/19 11:08	1
18O2 PFHxS	107		25 - 150	10/16/19 21:12	10/17/19 11:08	1

Lab Sample ID: LCS 320-331567/2-A
Matrix: Water
Analysis Batch: 331659

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 331567

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorooctanoic acid (PFOA)			40.0	42.0		ng/L		105	64 - 124		
Perfluorobutanesulfonic acid (PFBS)			35.4	35.4		ng/L		100	73 - 133		

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C4 PFOA	103		25 - 150
18O2 PFHxS	108		25 - 150

Lab Sample ID: LCSD 320-331567/3-A
Matrix: Water
Analysis Batch: 331659

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 331567

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorooctanoic acid (PFOA)			40.0	42.8		ng/L		107	64 - 124	2	30
Perfluorobutanesulfonic acid (PFBS)			35.4	35.3		ng/L		100	73 - 133	0	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C4 PFOA	106		25 - 150
18O2 PFHxS	113		25 - 150

QC Association Summary

Client: Moffatt & Nichol
Project/Site: PFAS testing

Job ID: 320-53433-1

LCMS

Prep Batch: 319569

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-53433-1	EP-21	Total/NA	Water	3535	
320-53433-2	Smart Armor A	Total/NA	Water	3535	
320-53433-3	54 SST A	Total/NA	Water	3535	
320-53433-4	970	Total/NA	Water	3535	
MB 320-319569/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-319569/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-319569/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 320130

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-53433-1	EP-21	Total/NA	Water	537 (modified)	319569
320-53433-2	Smart Armor A	Total/NA	Water	537 (modified)	319569
320-53433-3	54 SST A	Total/NA	Water	537 (modified)	319569
320-53433-4	970	Total/NA	Water	537 (modified)	319569
MB 320-319569/1-A	Method Blank	Total/NA	Water	537 (modified)	319569
LCS 320-319569/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	319569
LCSD 320-319569/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	319569

Prep Batch: 331567

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-53433-1 - RE	EP-21	Total/NA	Water	3535	
320-53433-2 - RE	Smart Armor A	Total/NA	Water	3535	
320-53433-3 - RE	54 SST A	Total/NA	Water	3535	
320-53433-4 - RE	970	Total/NA	Water	3535	
MB 320-331567/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-331567/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-331567/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 331659

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-53433-1 - RE	EP-21	Total/NA	Water	537 (modified)	331567
320-53433-2 - RE	Smart Armor A	Total/NA	Water	537 (modified)	331567
320-53433-3 - RE	54 SST A	Total/NA	Water	537 (modified)	331567
320-53433-4 - RE	970	Total/NA	Water	537 (modified)	331567
MB 320-331567/1-A	Method Blank	Total/NA	Water	537 (modified)	331567
LCS 320-331567/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	331567
LCSD 320-331567/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	331567

Lab Chronicle

Client: Moffatt & Nichol
Project/Site: PFAS testing

Job ID: 320-53433-1

Client Sample ID: EP-21

Date Collected: 08/15/19 00:00
Date Received: 08/20/19 10:00

Lab Sample ID: 320-53433-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			0.1 mL	10.00 mL	319569	08/29/19 18:46	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1			320130	09/03/19 12:28	JRB	TAL SAC
Total/NA	Prep	3535	RE		0.01 mL	10.00 mL	331567	10/16/19 21:12	HJA	TAL SAC
Total/NA	Analysis	537 (modified)	RE	1			331659	10/17/19 12:34	JRB	TAL SAC

Client Sample ID: Smart Armor A

Date Collected: 08/15/19 00:00
Date Received: 08/20/19 10:00

Lab Sample ID: 320-53433-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			0.01 mL	10.00 mL	319569	08/29/19 18:46	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1			320130	09/03/19 12:36	JRB	TAL SAC
Total/NA	Prep	3535	RE		0.01 mL	10.00 mL	331567	10/16/19 21:12	HJA	TAL SAC
Total/NA	Analysis	537 (modified)	RE	1			331659	10/17/19 12:44	JRB	TAL SAC

Client Sample ID: 54 SST A

Date Collected: 08/15/19 00:00
Date Received: 08/20/19 10:00

Lab Sample ID: 320-53433-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			0.1 mL	10.00 mL	319569	08/29/19 18:46	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1			320130	09/03/19 12:45	JRB	TAL SAC
Total/NA	Prep	3535	RE		0.01 mL	10.00 mL	331567	10/16/19 21:12	HJA	TAL SAC
Total/NA	Analysis	537 (modified)	RE	1			331659	10/17/19 13:32	JRB	TAL SAC

Client Sample ID: 970

Date Collected: 08/15/19 00:00
Date Received: 08/22/19 09:15

Lab Sample ID: 320-53433-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			0.1 mL	10.00 mL	319569	08/29/19 18:46	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1			320130	09/03/19 12:53	JRB	TAL SAC
Total/NA	Prep	3535	RE		0.01 mL	10.00 mL	331567	10/16/19 21:12	HJA	TAL SAC
Total/NA	Analysis	537 (modified)	RE	1			331659	10/17/19 13:42	JRB	TAL SAC

Laboratory References:

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: Moffatt & Nichol
Project/Site: PFAS testing

Job ID: 320-53433-1

Laboratory: Eurofins TestAmerica, Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State Program	17-020	01-20-21
ANAB	Dept. of Defense ELAP	L2468	01-20-21
ANAB	Dept. of Energy	L2468.01	01-20-21
ANAB	ISO/IEC 17025	L2468	08-09-21
Arizona	State	AZ0708	08-11-20
Arkansas DEQ	State	19-042-0	06-17-20
Arkansas DEQ	State Program	88-0691	06-17-20
California	State	2897	01-31-20
Colorado	State	CA0004	08-31-20
Connecticut	State	PH-0691	06-30-21
Florida	NELAP	E87570	06-30-20
Hawaii	State	<cert No.>	01-29-20
Illinois	NELAP	200060	03-17-20
Kansas	NELAP	E-10375	10-31-19
Louisiana	NELAP	01944	06-30-20
Maine	State	2018009	04-14-20
Maine	State Program	CA0004	04-14-20
Michigan	State	9947	01-29-20
Michigan	State Program	9947	01-31-20
Nevada	State	CA000442020-1	07-31-20
Nevada	State Program	CA00044	07-31-20
New Hampshire	NELAP	2997	04-20-20
New Hampshire	NELAP	2997	04-18-20
New Jersey	NELAP	CA005	06-30-20
New York	NELAP	11666	04-01-20
Oregon	NELAP	4040	01-29-20
Pennsylvania	NELAP	68-01272	03-31-20
Texas	NELAP	T104704399-19-13	05-31-20
US Fish & Wildlife	US Federal Programs	58448	07-31-20
USDA	US Federal Programs	P330-18-00239	07-31-21
USEPA UCMR	Federal	CA00044	12-31-20
Utah	NELAP	CA00044	02-29-20
Vermont	State	VT-4040	04-16-20
Virginia	NELAP	460278	03-14-20
Washington	State	C581	05-05-20
West Virginia (DW)	State	9930C	12-31-19
Wyoming	State Program	8TMS-L	01-28-19 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: Moffatt & Nichol
Project/Site: PFAS testing

Job ID: 320-53433-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
3535	Solid-Phase Extraction (SPE)	SW846	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SAC = Eurofins TestAmerica, Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: Moffatt & Nichol
Project/Site: PFAS testing

Job ID: 320-53433-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
320-53433-1	EP-21	Water	08/15/19 00:00	08/20/19 10:00	
320-53433-2	Smart Armor A	Water	08/15/19 00:00	08/20/19 10:00	
320-53433-3	54 SST A	Water	08/15/19 00:00	08/20/19 10:00	
320-53433-4	970	Water	08/15/19 00:00	08/22/19 09:15	

Chain of Custody Record

Eurofins TestAmerica, Sacramento
880 Riverside Parkway

West Sacramento, CA 95605-1500
phone 916.373.5600 fax 303.467.7248

eurofins Environment Testing TestAmerica

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact	Project Manager: Emily Beck	Site Contact:	Date:	COC No:
Moffatt & Nichol	Email: ebeck@moffattnichol.com	Lab Contact: Karen Dahl	Carrier:	____ of ____ COCs
4225 E. Conant Street	Tel/Fax: (562) 308-5316			TALS Project #:
Long Beach, CA 90808	Analysis Turnaround Time			Sampler:
(562)308-5316	☐ CALENDAR DAYS ☑ WORKING DAYS			For Lab Use Only:
(xxx) xxx-xxxx FAX	TAT if different from Below 30____			Walk-in Client:
Project Name:	☐ 2 weeks			Lab Sampling:
Site:	☐ 1 week			Job / SDG No.:
P O #	☐ 2 days ☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	PFAS Standard List, 537 (modified	Sample Specific Notes:
EP-21	#######			W	1			X	
Smart Armor	8/15/19			W	1			X	
54 SST	8/15/19			W	1			X	
970	8/15/19			W	1			X	

320-53433 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd: 20.1 Corr'd: 20.1 Therm ID No.: AK-10

Relinquished by:	Company: Moffatt & Nichol	Date/Time: 8/15/19 1445	Received by:	Company: TA 112 V	Date/Time: 8/15/19 1445
Relinquished by:	Company:	Date/Time:	Received by:	Company: ETA WSac	Date/Time: 19 Aug 19 1000
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.26, dated 7/25/2019

for Received Extra Containers. DLT 8/20/19

Eurofins TestAmerica, Sacramento
880 Riverside Parkway

West Sacramento, CA 95605-1500
phone 916.373.5600 fax 303.467.7248

Chain of Custody Record

eurofins | Environment Testing TestAmerica

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact	**Project Manager: Emily Beck**		COC No:
Moffatt & Nichol	Email: ebeck@moffattnichol.com	**Site Contact:**	**Date:**	_____ of _____ COCs
4225 E. Conant Street	Tel/Fax: (562) 308-5316	**Lab Contact: Karen Dahl**	**Carrier:**	TALS Project #:
Long Beach, CA 90808	**Analysis Turnaround Time**			Sampler:
(562)308-5316	☐ CALENDAR DAYS ☑ WORKING DAYS			**For Lab Use Only:**
(xxx) xxx-xxxx FAX	TAT if different from Below 30_____			Walk-in Client:
Project Name:	☐ 2 weeks			Lab Sampling:
Site:	☐ 1 week			
P O #	☐ 2 days			Job / SDG No.:
	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	PFAS Standard List, 537 (modified)	Sample Specific Notes:
EP-21	#######			W	1			X	
Smart Armor	8/15/19			W	1			X	
54 SST	8/15/19			W	1			X	
970	8/15/19			W	1			X	

Direct Send to W. Sac

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for_____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd: 17.6 Corr'd: 18.3 | Therm ID No.: DKH

Relinquished by:	Company: Moffatt & Nichol	Date/Time: 8/15/19 2:45 PM	Received by:	Company: TA 112 V	Date/Time: 8/15/19 1445
Relinquished by:	Company:	Date/Time:	Received by:	Company: RTB	Date/Time: 8/16/19 905
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.26, dated 7/25/2019

Login Sample Receipt Checklist

Client: Moffatt & Nichol

Job Number: 320-53433-1

Login Number: 53433
List Number: 1
Creator: Her, David A

List Source: Eurofins TestAmerica, Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	Thermal preservation not required.
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	False	COC not relinquished.
Is the Field Sampler's name present on COC?	False	
There are no discrepancies between the containers received and the COC.	False	Refer to Job Narrative for details.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Moffatt & Nichol

Job Number: 320-53433-1

Login Number: 53433
List Number: 2
Creator: Her, David A

List Source: Eurofins TestAmerica, Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	Thermal preservation not required.
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	False	COC not relinquished.
Is the Field Sampler's name present on COC?	False	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	