

\*\*\* All present are expected to conduct themselves in accordance with our City's Core Values \*\*\*



## OFFICIAL NOTICE AND AGENDA

of a meeting of a City Board, Commission, Department Committee, Agency, Corporation, Quasi-Municipal Corporation or Sub-unit thereof.

Notice is hereby given that the Park and Recreation Committee of the City of Wausau, Wisconsin will hold a regular or special meeting on the date, time and location shown below.

Meeting of the: **PARKS AND RECREATION COMMITTEE OF THE CITY OF WAUSAU**  
Date/Time: **Monday October 7, 2019 at 4:30pm**  
Location: **City Hall (407 Grant Street, Wausau WI 54403) - Council Chambers**  
Members: **Gary Gisselman, Tom Neal, David Nutting, Patrick Peckham(c), Dennis Smith**

AGENDA ITEMS FOR CONSIDERATION (All items listed may be acted upon)

- 1 Call the Meeting to Order
- 2 Public Comment or Suggestions
- 3 Approve Minutes - September 3, 2019
- 4 Discussion And Possible Action Adopting a Forestry Specifications Manual
- 5 Discussion and Possible Action Regarding a Request by Citizens for a Clean Wausau to Access Riverside Park for Soil Testing
- 6 Discussion and Possible Action of the City to Conduct Soil Testing Within Riverside Park
- 7 Discussion and Possible Action to Approve Water Features in Jo Jo's Jungle and Adjust the 2020 Budget to Include Funding of the Water Costs
- 8 Educational Items
  - A. Summer Pool Usage Review
  - B. Dog Park Special Committee Update
  - C. Project Update
  - D. Program Update
- 9 Future Agenda Items - Athletic Park Discussion, River's Edge Master Plan
- 10 Next Meeting Date - November 4, 2019 at 4:30pm
- 11 Adjournment

Patrick Peckham, Chairperson

This Notice was posted at City Hall and faxed to the Daily Herald newsroom on 10/4/2019 @ 10:30 a.m. Questions regarding this agenda may be directed to Jodi Luebbe, Park Office (715) 261-1560.

In accordance with the requirements of Title II of the Americans with Disabilities Act (ADA), the City of Wausau will not discriminate against qualified individuals with disabilities on the basis of disability in its services, programs, or activities. If you need assistance or reasonable accommodations in participating in this meeting or event due to a disability as defined under the ADA, please call the City's ADA Coordinator at (715) 261-6620 or e-mail [clerk@ci.wausau.wi.us](mailto:clerk@ci.wausau.wi.us) at least 48 hours prior to the scheduled meeting or event to request an accommodation.

Distribution List: City Website, Media, WSD-Admin, Alderpersons, Mayor, Polley, Dept. Staff, Maryanne Groat, Brad Lenz, Eric Lindman, Christian Schock, Brad Karger, Wisconsin Woodchucks, Wausau Events, Public Access, Wausau River District, Patrick Hoerter

**DRAFT**

**CITY OF WAUSAU – PARK AND RECREATION COMMITTEE MEETING MINUTES**

Date/Time: September 3, 2019 at 4:00 p.m. Location: Council Chambers, City Hall

Members Present: Gary Gisselman, David Nutting, Pat Peckham (c), Dennis Smith, Tom Neal

Others Present: Jamie Polley-Parks, Recreation and Forestry Director, Eric Lindman-Public Works Director, Mayor Robert Mielke, David Patridge-Administrative Manager, Tom Kilian – Citizens for a Clean Wausau, Christopher Weems, news media, other interested parties

In accordance with Chapter 19, Wisc. Statutes, notice of this meeting was posted and sent to the Daily Herald in the proper manner. It was noted that a quorum was present and the meeting was called to order by Chairman Peckham at 4:00 p.m.

Public Comment – no comments brought forward

Approval of Minutes – **Motion** by Neal, second by Smith to approve the Park and Recreation Committee draft August 5, 2019 minutes. Motion **carried** by voice vote, vote reflected as 5-0.

Discussion Regarding Revisions to the Draft Forestry Specifications Manual – Polley explained that staff incorporated Committee’s concerns about tree protection policies particularly where it came to the reconstruction and widening of streets and doing sidewalk reconstruction. Under Section 5, language was added about the philosophy of implementation of preservation measures where feasible to preserve public trees in and around construction projects. Possible options are to skirt the concrete around a tree, to jog, arc, or ramp the sidewalk or even to shave and lift the concrete a little. Minor changes to the section were discussed. Polley will implement the changes and bring the document back for final approval. Polley mentioned that the City Forester, Blaine Peterson, will be retiring next week. **Motion** by Neal, second by Nutting to approve the proposed changes to the Forestry Specifications Manual. Motion **carried** by voice vote, vote reflected as 5-0.

Discussion and Possible Action Regarding Riverside Park Phase II Environmental Site Assessment – Peckham reviewed previous Committee actions. He clarified that he did not direct or intend that REI’s original recommendation for twenty borings be disregarded. He asked REI for another option, not a revision, and had used the number six for a starting point. It’s the Committee’s decision whether to go forward with any number of borings or zero borings.

Lassa commented that using the map prepared by the City surveyor he placed locations for proposed borings. Those were based on previous observations, historical information, and information brought up by other groups. The concern seemed to be focused on the southern portion of the park. There are six locations for hydraulic push soil borings where two samples will be collected at each. REI will collect a groundwater sample from each soil boring. There are two additional locations where soil samples will be collected from within six inches of the surface. Discussion occurred on the locations of the borings and possibly changing the locations of some of them. Smith thought they should be more concerned about surface testing then groundwater testing. There is already known groundwater contamination because of existing monitoring wells on the property and he questioned testing it more. Lassa commented they would be sampling away from those wells and he had been asked to put something together that was comprehensive for contamination in the park. He said depending on what their goal is, they could shift the location of some of the borings. If they are asking for an assessment of what the conditions in the park are, REI had tried to spread them out a bit putting some of them in the location of where the greatest concern is. It is up to Committee if they want to move some to do more in a centralized area or adjust the numbers of them. If they move all of them to a certain area it seems like there is more of a focus on a certain type of contaminant over others. It was a pretty extensive list of things to try to catch anything that they might see in the park boundaries.

Nutting discussed the future if they did find contaminants. Other areas of the City where contaminants were found have been covered, capped and planted with new grass. He questioned what the long term solution is, if necessary or if they just leave it alone and use the park as they have been for the past 40 years. Lassa thought the Department of Health staff that did assessments, if they were to take additional information, would probably put that into their risk calculations to determine if there was any sort of risk based off of exposure levels. He agreed that solutions when there is contamination is removing it, capping it, covering it, eliminating or limiting access. Gisselman questioned if there was other types of contamination in the park they should be concerned about besides what could be along the western edge of the park. Lassa said they know from the history of adjacent parcels that there has been impacts to the park, to the groundwater, to some soils from a number of substances supposedly from adjacent activities. He described for Peckham in detail how they conduct their soil samplings.

Lindman said Wauleco is performing dioxin tests and ideally the City would like to see those results. The City would like to see not only the test results from Wauleco, but also how the DNR responds to those and to be part of those conversations on any future testing that the DNR is going to require. If they find things in the soils and if there are higher levels of dioxins the City is not opposed to testing but would like that testing to be done by the people responsible. Peckham said the results from the analysis will be going to Wauleco and the DNR in September. The DNR will then require around 60 days to formulate some kind of response. Smith questioned where Wauleco is conducting the tests. Lindman said there is only one that is proposed in Riverside Park. The majority are to the southeast and northwest with some outlier ones for a total of 36. Smith didn't think there was reason for them to delay because Wauleco wasn't testing where they were testing. Lindman said they are not required to right now, but if they find anything the DNR is likely going to require them to do additional testing. He will be part of the conversation of pushing for testing and keeping the best interest of the City at the forefront.

Tom Kilian, 133 E Thomas Street, Wausau, WI 54401 – Citizen for a Clean Wausau – Kilian said his understanding was that Wauleco is testing only for dioxins and pherons in their air deposition study and only one spot in Riverside Park. The three proposed borings near the forest edge look appropriate and their group is not adverse to the borings near the trail. He felt the soil plan in its current state would not be recognized as a sufficient, acceptable or legitimate testing plan. He commented that some of the budget was lost to groundwater testing and project management. Polley told Kilian that he had been asked previously to provide a recommendation of where the samples should be taken that would satisfy their group. She felt he should provide the information and that is what Committee should react to. Nutting didn't think it would be possible to make the group happy and he didn't believe all the residents wanted to fund the borings when that area of the park is hardly used and could easily be fenced off. Kilian said they had provided a presentation with three zones of testing, the depth, recommended testing and the specific EPA method of dioxin testing. Polley felt that Lassa had taken Kilian's recommendations into consideration for the locations but Kilian was still saying it wasn't good enough. Kilian did not think they had put any borings next to the trail. He discussed parts of their previous presentation and offered to provide more detail.

Mayor Mielke felt they should wait until they receive the report back from Wauleco and DNR's recommendation. The City has never been adverse as far as doing testing. Fiscally though, he doesn't have the money for it right now. If they wait a couple months to make a decision when they have a better idea as far as the budget going into 2020. If testing is decided he will have money set aside depending on what they want to do. He also noted that if it is someone else's fault then they should be responsible for paying for it because the City did not cause this situation. If something is found it will be dealt with but they should wait and find what's happening to get a better idea of everything including the cost.

Peckham said in terms of not having the money right now he believed they should ask for the money to do what they think is right and if it takes awhile to make it happen that's the reality but shouldn't prohibit them from stating their wishes. Smith commented that the City has a contingency fund. He would lean towards finding out what Wauleco is going to do but is concerned that Wauleco is taking one sample in the park. He reiterated that he doesn't think they should test for groundwater and even questioned why they are testing four feet down. He requested Kilian give them a map and show them where the citizen group wants the borings and Committee will take a look at it. Kilian said they would have it by Friday. **Motion** by Gisselman to proceed with the \$32,639.00 and engage REI for the testing of Riverside Park. He said his motion does not include exactly where the borings are placed, he would just like to start the process of moving something forward. **Motion failed** for lack of a second.

Christopher Weems, 500 Grand Ave., Wausau WI 54403 felt that the City of Wausau shouldn't be stuck for \$32,000. If the Citizen group wants to test it they should pay for it out of their own pocket because it's not fair to the City.

**Motion** by Neal, second by Smith to table this until the next meeting at which time they will re-look at the map as it reflects the thoughts of the citizens group, remaining within this general estimate as a maximum, asking to eliminate the groundwater and possibly the four foot depth testing and stick with what he would describe as "disturbable" surface dirt to a reasonable depth. That is the kind of thing he would like to clarify at the next meeting and send that with their recommendation to the Finance Committee. Peckham clarified that he was saying those are things they should consider and they are not locking into them today. Gisselman asked Lassa his thoughts. Lassa said if they look at the proposal there's a substantial amount of money in the testing of all the parameters. It is up to Committee's discretion to not test deeper but REI was originally asked to give an extensive testing of the park soil and groundwater so that is the path they took for a long list of parameters that was brought forth by the citizens. Peckham said they are not asking Mr. Lassa to come back to the next meeting but will rely on staff input. **Motion carried** by voice vote, vote reflected as 4-1 with Gisselman opposing.

2020 Budget - Discussion and Possible Action on the Proposed Parks, Recreation and Forestry Department 2020 Budget and Fee Directive – Polley gave a brief overview of the budget. It includes a 2% wage increase for full time and seasonal wages. A recreation intern was added this year. There have been some wage and salary savings from back filling the four FTE retirements. Several of the approved supplemental budget requests from 2019 have been included into the 2020 base budget. This includes operating and maintaining Riverlife north of WOW, fully funding the 2<sup>nd</sup> year of the Emerald Ash Borer Treatment/Removals, and the annual funding of 0.50 FTE of full time labor that is focused on the operation and maintenance of City park facilities that are tourism related. This labor could continue to be funded through the room tax fund where it has been since 2017. Other budget increases include adding CSO Officers for monitoring the Woodchucks games. Typically that hadn't been budgeted for and the Department was paying for it out of leftover budget funds. Other increase included budgeting for a special assessment for curb/gutter/street replacement in front of the park operations facility for 2020, 2021 and 2022, adding additional 3<sup>rd</sup> Street flower baskets, Riverlife fountain chemicals, increasing the size of replacement street trees to meet the standard of the Forestry Specification Manual, and an adjustment to insurance premiums. Smith questioned why they are providing security for a private business. Polley said the Woodchucks are charged fees and there is an increase each year that is included so the revenues offset some of the costs there. She will check further into that history. She mentioned that staff is researching ways to decrease the costs of treating the Riverlife fountain water because of the current expense. David Patridge, Administrative Manager discussed this year's budget compared to last years. The departments overall levy is up 9.82% comparing the 2020 budget they put together to their 2019 modified budget. Polley mentioned the biggest expenditures are \$38,000 for insurances. Staff included everything that had been approved as supplemental to be operational for the Department. It's an operation they have been directed to move forward with so how it's funded will be the Finance Director's recommendation to Council. **Motion** by Nutting, second by Neal to take the recommendations and move them forward to the next step for approval. Motion **carried** by voice vote, vote reflected as 4-1 with Smith opposing.

Polley discussed the fee directive. There are increases for daily boat launch passes, demo equipment, 400 Block Park fees, shelters, memorial park benches, and tennis/pickleball court commercial and private use. Polley explained that some changes to the 2020 swimming lessons include changing to two-week long sessions with a make-up week and also adding evening sessions. Questions were answered. **Motion** by Neal, second by Nutting to approve the fee directive. Motion **carried** by voice vote, vote reflected as 5-0.

#### Educational Items

A. Riverlife Park Update – Bike Share, Trail and PIP Care – The bike share program that has been sponsored by the Community Foundation is on track to be operational by late September. Concrete pads will be installed for the racks the third week of September. At that time Zagster is planning to be in town assembling the stations and bikes. Staff is currently working to finalize the fee structure for the program. There will be two stations installed; one under the Bridge Street bridge and one along the canal south of WOW. Staff will continue to plow the trail in the winter. There has been concern and inquiry about the care of the poured in place rubber surfacing at the Riverlife Park. Staff has obtained the care instructions for the surfacing and will be following the maintenance guidelines. With the amount of use of the playground this will be an ongoing task. Questions were answered.

B. Dog Park Special Committee Update – Polley said the fence was ordered and will be here by the end of October. Staff is starting the seeding process so that it will be ready by spring. A temporary park sign will be installed this week. The group continues to work on fundraising items. The Committee chose not to recycle the Great Lakes Cheese fencing because the cost savings were not significant enough.

#### C. Project Update

Scholfield Park: Boat launch reconstruction is complete. Site is prepared for asphalt patching adjacent to launches. New scoreboard installation on youth baseball diamond. Stewart Park: Contractor is continuing work on finial replacement on west pillar and reconstruction of east pillars. Barker Stewart Island: Barker Stewart Bridge cleanup is scheduled for end of September. The Park Department will work with a contractor and Department of Public Works. River Edge Trail: Vista was created overlooking river and a memorial bench installed near Winton Street. Athletic Park: Replacement of outfield wall panels and framing. Dog Park: Turf renovation has started this week for entire site. Temporary sign will be installed. The fence is scheduled to be installed in late October. Brockmeyer Park: New LED scoreboard installation on baseball diamond. Pools: Winterization of plumbing systems and equipment is underway. Gilbert Park: Boat launch area is being prepared for delivery of new commercial concrete planks/slabs. EAB Ash Tree Treatments Update: Summer of 2019 began treatment of our ash population within the City of Wausau. It was determined to treat ash on both sides of the river to secure a broader

population distribution of protected ash. The Park Department employed two seasonal personnel with their primary role being injection of ash. These individuals were augmented and trained with full-time staff to accomplish this task. The objective was to treat roughly half of the best 70 percent of our ash. This would equal approximately 2000 trees. Due to weather related issues this season resulting in several days of slow uptake, we were able to treat approximately 1000 ash trees. Again, due to poor uptake, treatment concluded on 8/22/19 for this year. Treatment via injection of Tree agē (*emamectin benzoate*) maintains its integrity within the tree for two years, so trees can be treated every other year.

Routine Operations/Programs: Urban forestry program includes tree trimming, removals, stump grinding; building and structure maintenance, shelter reservations, special events, equipment maintenance and repair, mowing operations, pool operations, sports facilities (Athletic Park, City ball diamonds and soccer fields)

Polley noted that currently the Emerald Ash Borer hasn't been officially found within the city limits of Wausau. Staff is watching for it and continuing to remove trees where there is construction or trees that are in poor health.

#### D. Program Update

400 Block – Very busy and successful year of concerts on the square and Marketplace Thursdays. Concerts have now ended and Marketplace will run until September 19<sup>th</sup>.

Festival of Arts – The department will supply electrical needs, facilities and support for the Festival of arts September 6-8.

Fern Island - the Department set up fencing and other needs for another successful Big Bull Falls Blues Festival on Fern Island. Bacon and Beer Festival will be September 21<sup>st</sup> and our Department will supply labor and material for that event as well.

Future Agenda Items – Riverside Park Testing

Next Regular Meeting – Monday, October 7, 2019 at 4:30 pm in Council Chambers at City Hall.

Adjourn – **Motion** by Neal, second by Gisselman to adjourn at 5:45 p.m. Motion **carried** by voice vote, vote reflected as 5-0.

## **AGENDA SUMMARY**

4. Discussion and Possible Action Adopting a Forestry Specifications Manual  
In August and September the Committee reviewed various drafts of a Forestry Specification Manual that has been developed by Canopy Forest Consulting in conjunction with the City Engineering Department and the Parks, Recreation & Forestry Department. The committee requested to see additional detail and information regarding tree protection during construction projects, specifically sidewalk construction. The revisions addressing tree protection during construction projects was reviewed and approved by the Committee on September 3, 2019. All comments and corrections have been made to the manual and the Committee is asked to adopt the Forestry Specifications Manual as presented.
5. Discussion and Possible Action Regarding a Request by Citizens for a Clean Wausau to Access Riverside Park for Soil Testing  
Citizens for a Clean Wausau (CCW) have requested the City allow them access to Riverside Park to complete their own testing. Attached you will find their formal request letter. According to their request, CCW would like to complete up to 3 soil tests in Riverside Park at their expense using Sand Creek Consultants. Sand Creek Consultants is the firm previously hired by CCW to complete the testing on City owned property along the Thomas Street corridor. A memo is attached
6. Discussion and Possible Action of the City to Conduct Soil Testing Within Riverside Park  
At the September Committee meeting Citizens for a Clean Wausau was asked to submit a proposal to city staff indicating where the group felt soil testing should be conducted. Staff was directed to bring that proposal, when received, to the next Committee meeting for review and possible action. The Committee did not feel that REI needed to be present at the next meeting. The City Engineering staff has included a memo for the Committee's review. The Committee is asked to review the memo and proposal to determine if further testing is recommended, the committee should make a recommendation to the Finance Committee for funding of the testing if so desired.
7. Discussion and Possible Action to Approve Water Features in Jo Jo's Jungle and Adjust the 2020 Budget to Include Funding of the Water Costs  
Jo Jo's Jungle playground construction is underway and the playground equipment will be installed by the end of the year. Due to the weather this fall, the poured in place surfacing will not be installed until the spring of 2020. The original design of the playground included a water feature area with a labyrinth and water tower. These water features were recently taken out of the first construction phase to reduce the budget of the playground. At this time it appears there may be enough funds remaining at the end of the project to add these water features back in to the playground. The features have changed from the original design to include 8 water jets in addition to the labyrinth and smaller water pyramid. Pictures of the water features are with the Committee packet.  
  
If the water features are added back into the playground design, the cost to maintain and operate the playground will increase over what is currently budgeted. As we have seen at Riverlife and the 400 Block there is a water charge and water jets increase the maintenance cost of the park. The city will be charged a water and sewer fee at Brockmeyer Park. The water features at Jo Jo's Jungle will only be activated by users and are not on a timer to run consistently like Riverlife or the 400 block however it is anticipated that the system will be used heavily during the summer months utilizing approximately 1.7 million gallons of water. The cost for the water use is estimated to be between \$5,000- \$10,000 per year. The water features will add a unique element to the playground, they will also add maintenance costs that were not anticipated.

**AGENDA SUMMARY**

If the Committee approves of the addition of the water features to the playground the Committee is asked to recommend to the Finance Committee to approve an increase to the proposed 2020 Parks, Recreation & Forestry Department budget of \$10,000 for the water costs of the water features. Staff also recommends that an agreement with Jo Jo's Jungle is executed that will provide the City with the ability to remove the water features if costs to maintain the features become too great. The agreement will be similar to the agreements entered into for sculptures within the city. A draft of the agreement is attached.

**8. Educational Items**

**8A. Summer Pool Usage Review**

The total open swim attendance at all three pools for the 2019 summer season was 30,961 (including free days). Seventeen free days were offered in addition to free Thursday evenings. The total attendance for the free days and free Thursday evenings was \$6,040. Two of the free days were sponsored. The pools opened on Saturday, June 8<sup>th</sup> and Kaiser and Schulenburg closed on August 11 while Memorial closed on August 17<sup>th</sup>. The attached calendars provide an overview of the daily attendance of each pool. Days the pools were closed are also illustrated on each calendar.

In addition to free days a number of special events were offered at the pools this summer to increase daily attendance. A few of the special events included Wacky Water Olympics, National Mac and Cheese Day, a Disney Pool Party, etc. Daily open swim attendance was up 8% over 2018, swimming lesson numbers were up 6% over 2018 while pool passes were down 25% from 2018. The total expenditures for the pools totaled \$255,114.00 and total revenues totaled \$112,483 (\$68,406.00 in revenue was from open swim and passes).

**8B. Dog Park Special Committee Update**

An update on items the committee has been discussing and working on will be provided. The Committee has raised \$46,340 to date and an additional \$20,000 has been requested to be allocated from the City CIP budget.

**8C. Project Update**

**Scholfield Park:**

New scoreboard installation on youth baseball diamond has been completed this week.

**Boileau Field:**

Infield reconstruction will be complete this week.

**Dog Park:**

Site was recently prepped and seeded. Germination is starting. Turf will be "pushed" along going into late fall.

**Oak Island Playground:**

Staff has removed existing playground and put in storage for donation next season. Contractor is delayed for new install due to wet conditions.

**AGENDA SUMMARY**

**Stewart Park:**

Contractor is finished with pillar work. Staff has completed soil work. Some additional brushing for visibility of structures is scheduled.



**Thom Field:**

Fence work; enlarged gate entrance for service truck access  
Grading; regraded the ice rink area for a more level surface

**Pleasant View Playground:**

Playground equipment will be delivered this week. Park staff will begin installation in the next couple weeks.

## **AGENDA SUMMARY**

### **Riverlife/River Edge Trail**

Barker Stewart Bridge debris cleanup is underway. Additional debris cleanup within the river bed adjacent to park areas is scheduled.



### **Water Systems:**

Winterization of areas done for the season is underway. (Pools, fountains, shelters, irrigation systems)

### **Routine Operations/Programs:**

Urban forestry program; tree trimming, removals, stump grinding,  
Building and structure maintenance.

Shelter reservations and **Special Events**

Equipment maintenance and repair

Mowing operations

Pool Operations

Sports Facilities (Athletic Park, City ball diamonds and soccer fields)

### **8D. Program Update**

#### **400 Block:**

Festival of Arts – we supported the event on the 400 Block. Great weather and the event went great.

3M had a very successful Anniversary event on September 14<sup>th</sup>

IronBull –Ultra Trail on October 5<sup>th</sup>

IronBull – Red Granite Grinder – October 19<sup>th</sup>

# Draft

## City of Wausau Tree Planting & Preservation Specifications Manual



Adopted by:

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## **Introduction**

Taking care of our Urban Forest means protecting our Wausau quality of life. Properly planned and managed, the urban forest provides significant ecological, social and economic benefits that promote the well-being of our community. Research proves that healthy trees beautify the community, increase property values, help improve air and water quality, reduce erosion and storm water runoff, reduce greenhouse gases by absorbing carbon dioxide, save energy, keep the city cooler, reduce noise, calm traffic, provide homes for wildlife and enhance livability.

The purpose of the following specifications is to help ensure all City of Wausau residents get to experience the tree benefits previously listed. These specifications will provide guidelines to improve and sustain the City of Wausau's urban forest health. An important aspect of these benefits is the presence of mature, healthy trees in the city, which can be appreciated through tree preservation methods, sound new planting specifications, and promoting species diversity.

## **Section 1.0 Authority, Policy, Function**

### **1.1 Authority**

Pursuant to authority granted under Municipal Code 12.56 STREET TREES (appendix F) of the City of Wausau and the review and assistance of the Marathon County Parks, Recreation and Forestry Department and the City of Wausau Public Works Department, the following serves as the arboricultural specifications and standards of practice for the City of Wausau, Wisconsin, hereinafter referred to as the **Tree Planting and Preservation Specifications Manual**.

### **1.2 Policy**

The policy of the City of Wausau Municipal Code 12.56 STREET TREES is to regulate the planting, transplanting, maintenance, removal and protection of public trees and shrubs in the City in order to alleviate hazardous conditions which may result in injury to persons using the streets, sidewalks or other public property within the City. It is also a policy to promote and enhance the beauty and general welfare of the City by protecting trees and shrubs from undesirable treatment, maintenance practice, planting and removal.

### **1.3 Function**

The general responsibility of the City Forester and the Wausau/Marathon County Parks, Recreation and Forestry Department is to maintain trees and shrubs located on all public properties, including, but not limited to, boulevards, medians, parks, and other public facilities and spaces. This involves all phases of arboricultural work from planting through removal. The City of Wausau Department of Public Works is charged with replacing and repairing streets and sidewalks, which can involve tree removal and conflicts with tree roots. It became evident that an arboriculture policy was necessary to help bridge the gap between these departments that impact the urban forest and work to enhance it. These specifications are to serve as a standard for the planting, preservation and maintenance of all public trees and will apply to City employees, contractors or private individuals performing work. In abiding by and enforcing these specifications, the Wausau/Marathon County Parks, Recreation and Forestry Department and the City of Wausau Department of Public Works makes every effort to maintain a safe and aesthetically pleasing community. The City Forester must approve any exceptions to these specifications. The Tree Planting and Preservation Specifications Manual should always be adhered to, but may be amended at any time that experience, new research, or laws indicate that improved methods or circumstances make it advisable.

## **Section 2.0 Tree Planting Standards**

### **2.1 Newly Planted Tree Size Requirements**

All trees planted within public spaces must be of sufficient size to absorb the abuse and conditions common to trees planted in urban areas. The minimum allowable size for shade trees is (2) inch caliper and (1 ¾) inch caliper for ornamental trees, however larger sizes may be required to ensure survival for specific situations. Tree caliper shall be measured six inches above the ground to the nearest (¼) inch.

### **2.2 Required Condition of Newly Planted Trees**

Unless otherwise specified, all trees shall conform to the American Nursery and Landscape Association's *American Standard for Nursery Stock*, (ANSI Z60.1-2014). Each tree chosen for planting shall be a high-quality, healthy tree with evidence of vigorous growth during the previous year. All trees shall have a comparatively straight, single trunk, void of codominant leaders, exhibit well-developed leaders and crown, and the roots shall not only be characteristic of the species, cultivar or variety, but also exhibit evidence of proper nursery pruning practices. Ornamental trees may be multiple-stemmed if planted in parks or open green space and can be pruned for adequate clearance. At the time of planting, all trees must have a full healthy crown, be free of mechanical injuries and display no other objectionable features that will affect the future form, health, and beauty of the tree.

### **2.3 Planting Methods**

Proper planting methods (Figure 1) are critical to ensuring a high level of transplanting success by encouraging proper root growth and reducing transplant shock.

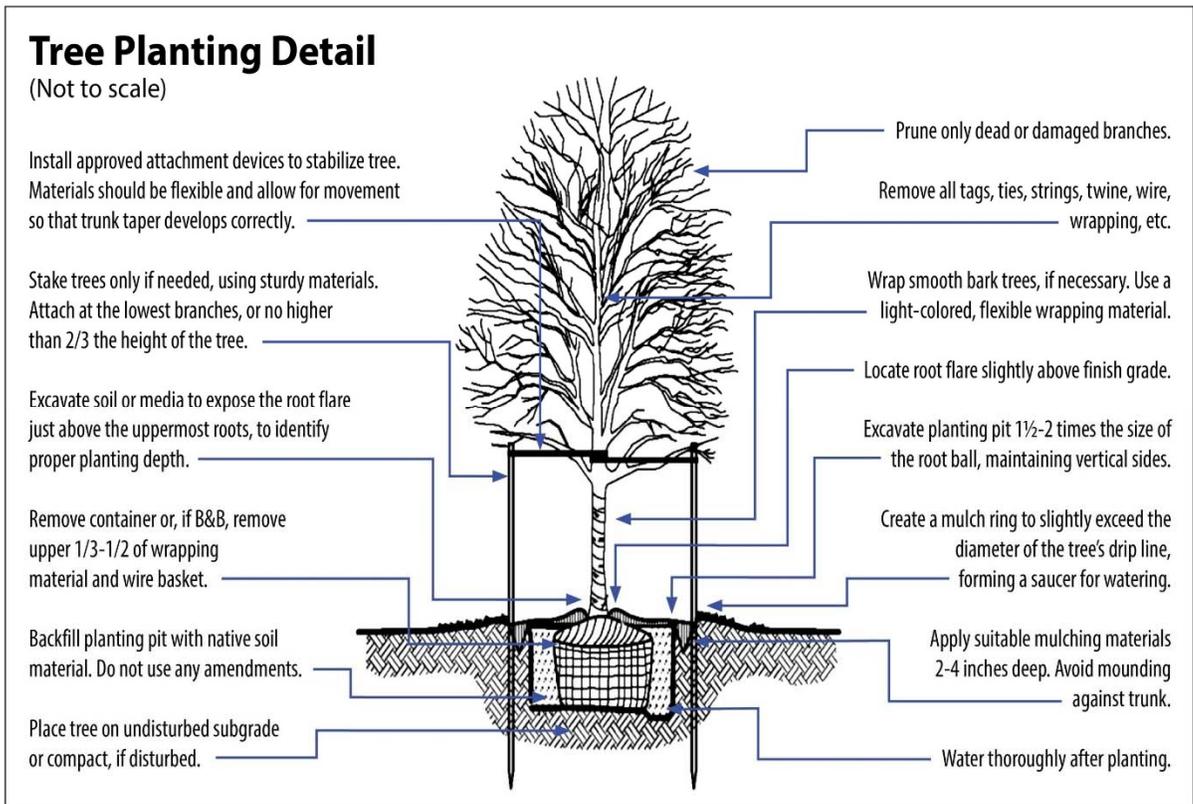


Figure 1 Proper Tree Planting Methods

**2.3.1** Dig a large planting hole 2-3 times the diameter of the root ball. Leaving a pedestal of soil in the center of the hole on which to rest the tree. The root/trunk flare should be at or slightly above the finished grade. When using;

- **Balled and Burlapped planting stock:** remove the wire, burlap and twine from at least the top one half of the root ball, thus minimizing disturbance to ensure the root ball's integrity.
- **Potted planting stock:** remove pot, **box cut the root ball** on the outer most edges, thus removing and minimizing any future tree girdling roots.
- **Bare Root planting stock:** maintain moisture in roots during transportation of the tree, dig irregular shaped planting hole to accept all available roots, thus minimizing root damage.

**2.3.2** If necessary, use a sharp hand pruner to remove any damaged or trunk girdling roots as needed. Whenever possible, backfill the hole with native soil. Water the tree generously to eliminate large air pockets and firm the soil around the tree's roots.

## 2.4 General Maintenance

Since all trees suffer a certain amount of transplant shock, due to 95% of a tree's roots being cut when dug in the nursery, newly planted trees require special maintenance for one or two growing seasons following planting. Typically, it takes one year per caliper (diameter) inch for establishment. All newly planted tree maintenance practices shall follow approved American National Standards Institute's *Standard Practices for Tree Care Operations – Post Planting Care (ANSI A 300 (Part 6))*.

## 2.5 Watering

Regular watering is important to aid in the development of a strong new root system. Newly planted trees require approximately 10 gallons of water per caliper (diameter) inch per week. Residents are asked to help water the street trees planted in the boulevard adjacent to their house during the growing season. City staff will water all park and green space plantings, but only provide supplemental watering for plantings in residential areas.

## 2.6 Mulching

A layer of mulch around the newly planted tree is beneficial. It helps reduce competition from grass and weeds, retains soil moisture, improves soil fertility and structure and protects the trunk from damage caused by mowers and string trimmers. A (3-4) inch layer of mulch shall be placed at an even depth and 3' minimum diameter around the tree. **Mulch shall be pulled away from the trunk so as not to be touching the trunk as this promotes fungal diseases and encourages rodents to girdle the bark at the base of the tree.** Shredded bark or wood chips are recommended materials, but be sure the material is seasoned or composted before using. The use of stone or other inorganic material is discouraged and generally not recommended. Residents should leave mulch in place.

## 2.7 Pruning

No pruning should occur at the time of planting except to remove dead or broken branches. Unnecessary pruning at this time may reduce the amount of stored energy the plant holds and may stress the tree. A pruning schedule may be started two years after planting.

## 2.8 Fertilization

Adequate quantities of essential nutrients and elements are typically already available on site after new root growth starts. Provision of good drainage and adequate soil moisture are far more important following planting than fertilization. Apply fertilizer sparingly and only to correct a specific deficiency. Since excessive fertilization can "burn" roots and stimulate crown growth faster than the roots can supply water, it is **best to wait until the third year after planting to begin applications.**

## 2.9 Staking

**Only stake a newly planted tree if it is necessary to straighten the stem or provide additional support.** When staking is necessary only use broad, soft strapping and leave some play for the tree to sway in the wind. **All staking material should be removed within two years unless deemed necessary for continued stability.**

### 2.1.0 Wrapping

Studies have found that trunk wrap often does more harm than good. However, wrap may be seasonally used to protect young trees from snow and ice damage or rodents, but should be removed every spring to prevent long-term damage.

## Section 3.0 Location of Newly Planted Trees

All boulevard street trees shall be planted midway between the curb and sidewalk (or where the sidewalk would be if there is no sidewalk). Median trees should be centered between

curbs. Both boulevard and median trees should be planted on center, unless in the opinion of the City Forester or City Engineer, there is enough reason to plant the trees off-center.

### 3.1 Determining Large or Small Tree Planting Spaces

**Large**-growing trees (Appendix B) shall be planted in boulevards or medians with a minimum width of 5'. No large trees should be planted under overhead secondary or primary electrical distribution lines. Trees planted to the side of power lines shall be carefully selected with mature height, spread and form in mind to minimize future conflicts.

Only **Small**-growing trees (Appendix A) shall be planted in boulevards or medians with a minimum of 4'-5' wide planting space.

Species selection for the City of Wausau downtown **Planting Pits** will be selected at City Forester or City Engineer discretion.

### 3.2 Spacing

Future maintenance problems can be minimized by careful and thoughtful placement of trees. Spacing of trees is a function of local site conditions, the species or cultivar used, and their mature height, spread and form. To promote urban forest canopy closure and provide a safe minimum spacing distance between trees, crown spread at species maturity should be determined. **The spacing guideline for all newly planted trees requires a minimum distance of  $\frac{3}{4}$  of the mature crown spread spacing for the selected variety (maximum crown spread x 0.75 = minimum spacing between trees).** Appendix A and B should be referenced when determining mature crown spread and minimum  $\frac{3}{4}$  crown spacing for selected species. The City Forester may make exceptions to this guideline when circumstances warrant, and public safety is not threatened.

### 3.3 Distance Away from Infrastructure

Newly Planted street trees shall be appropriately spaced from other public infrastructure to minimize infrastructure damage, allow for maintenance, avoid future conflicts and promote safety. All newly planted trees shall be spaced using the following Grey vs Green guidelines (Figure 2). The City Forester or City Engineer may make exceptions to these guidelines when circumstances warrant, and public safety is not threatened.

Existing Element	Min. Distance from Tree
Cross Street-Intersection	25'
Street Curb, Building Entrance or Doorway	2'
Stop Sign, Traffic Signal	20'
Street Light Base	12'
Pedestrian Level Light Base, Utility Pole, Fire Hydrant	10'

Crosswalk	7'
Alleys, Driveway, Carriage Walk	6'
Bike Rack, News Rack, Trash Can, Utility Box, Transit Shelter, Parking Meter	5'
Underground Utility	6'
Overhead Utility	Clear at Max Species Height
Loading Zone, Bus Stop	Clear of Zone

Figure 2 Grey vs Green guidelines

**3.3.1 Park Spacing:** All newly planted trees in maintained parklands should be a minimum of 8' or more away from other trees or infrastructure.

## Section 4.0 Recommended Street Trees

Appendices A and B contain the lists of tree species approved for planting in the City based upon their mature size. The Wausau/Marathon County Parks, Recreation and Forestry Department shall periodically review the trees listed in these appendices to determine whether any species, cultivars or varieties should be added or removed from the lists. The City of Wausau continues to invest in the health of the urban forest by avoiding monocultures and planting a variety of native and other hardy non-invasive species.

### 4.1 Conifers

Conifers may only be selected for planting within city parks and open green spaces provided the trunk is no closer than 14 feet to the back of the curb or 10 feet behind the existing public sidewalk. Also, it may not be closer than 35 feet from the non – approach corner of the intersection of two right of way lines and no closer than 20 feet to the edge of the nearest driveway.

### 4.2 Undesirable Street Trees

Unacceptable species or their varieties, as listed in Appendix C, shall not be planted on City property, except in special locations where, because of characteristics of adaptability or landscape effect, they can be used advantageously. Their lack of suitability is based upon objectionable growth habits, fruiting habits, form, susceptibility to serious diseases, propensity to incur storm damage, and other limitations. The limitations listed for each tree or species are the more serious problems encountered locally.

## Section 5.0 Tree Protection Policies

### 5.1 Reconstruction and Widened Streets

When trees are removed in preparation for reconstruction or widening of any established street, new trees will be planted provided there is adequate space in the boulevard and medians to support tree

growth. The expense of this planting shall be borne by the City and incorporated into the project. Before planting and upon Landscape Plan Review the City Forester or City Engineer shall determine if the location and species of the trees selected meet urban forest goals.

**5.1.1** For projects with trees identified on the Landscape Site Plan as remaining and in the project work area Tree Protection Zones (TPZ) (Appendix D) must be located and installed by contractors following approval by the City Forester or City Engineer.

**5.1.2** It is the philosophy of the City to implement preservation measures where feasible to preserve public trees in and around construction projects.

## **5.2 Determining and Installing Tree Protection Zone (TPZ)**

A critical step in retaining healthy trees during construction and development is the protection of tree roots from disturbance. Each tree has a critical root zone (CRZ) that varies by species and site conditions. The International Society of Arboriculture (ISA) defines CRZ as an area around a tree determined by the trees diameter at breast height (DBH). The City of Wausau defines this area as the Tree Protection Zone (TPZ) (Appendix D) and requires tree protection elements to be installed (**Ord. 12.56.040**).

**5.2.1** The TPZ (Figure 3) radius equals 1' for each 1" of trunk diameter measured 4.5' above grade (DBH). Modifying TPZ requires prior approval by the City Forester or City Engineer.

**5.2.2** Install tree protection fence around the TPZ 4' tall, supported with 2" x 6' steel posts or equivalent on minimum 8' spacing, made of high-density polyethylene fencing with 3.5" x 1.5" openings, color orange or approved equal, marked with 11" x 17" signs, spaced every 50', stating Tree Protection.

**5.2.3** Maintain existing grade within the TPZ unless otherwise approved by the City Forester or City Engineer.

**5.2.4** The Tree Protection Fence must be maintained until completion of work.

**5.2.5** No tree pruning shall be done except by City of Wausau Pruning Permit.

**5.2.6** No storage of materials or operations of equipment may take place inside the TPZ.

**5.2.7** Contractors may only open trench with approval from the City Forester or City Engineer.

TREE PROTECTION ZONE RADIUS  
EQUALS 1' FOR EACH 1" OF  
TRUNK DIAMETER MEASURED  
AT 4.5' ABOVE GRADE.  
MODIFIED -TPZ REQUIRES PRIOR  
APPROVAL.

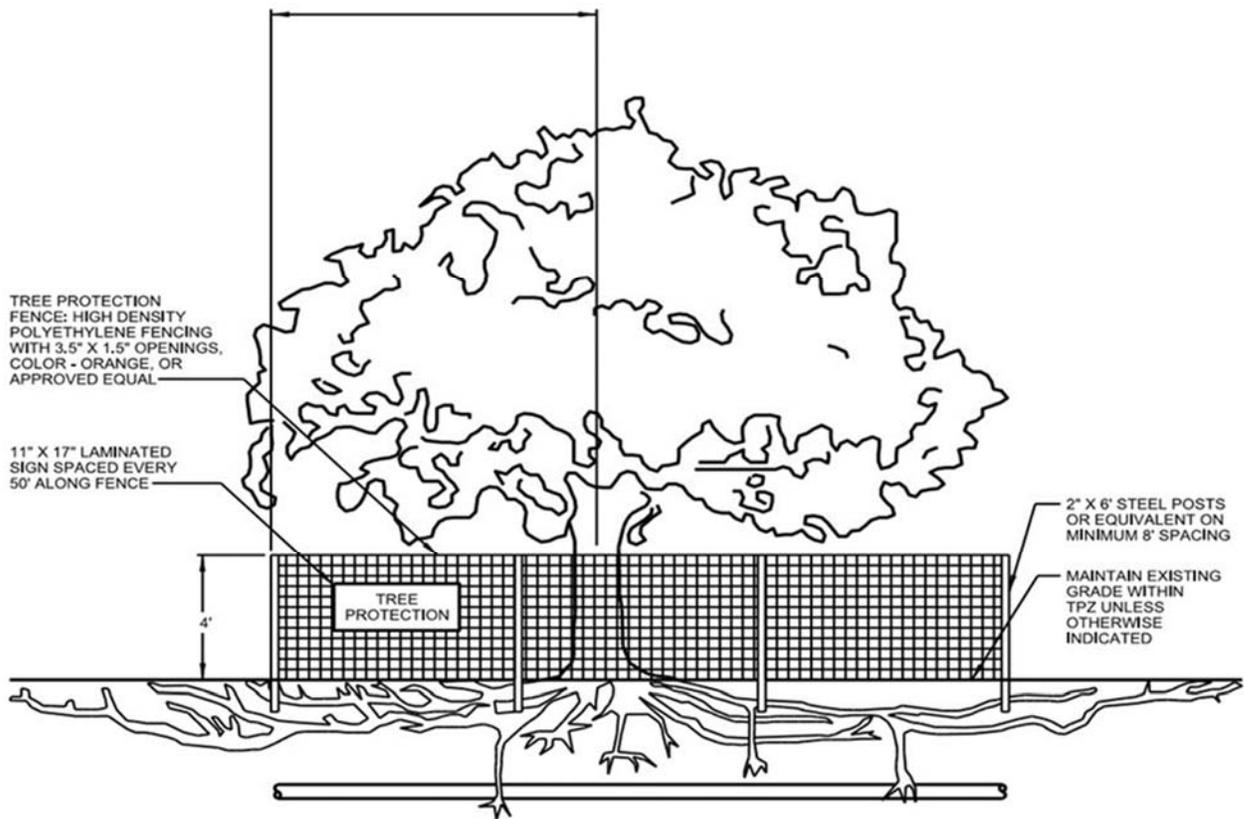


Figure 3 Tree Protection Zone (TPZ)

**5.2.8** All roots over (1) inch in diameter that are part of trees being protected with a TPZ shall be cleanly cut immediately in back of any damaged section on the same day of excavation. Cuts may be made with lopping shears, chainsaw, or other means which will produce a clean cut. Exposed roots shall be covered the same day they are exposed by means acceptable to the City. Acceptable means include wooded bark mulch or similar to protect roots. The contractor shall not rip or pull roots toward the trunk of the tree while excavating with a backhoe. The use of a backhoe to cut roots is NOT acceptable.

**5.2.9** Where **curb or sidewalk reconstruction** is being performed a TPZ does not have to be installed due to the fact most sidewalks are located within the TPZ. Close attention should be placed on a tree's Root Plate. A tree's Root Plate is determined by multiplying DBH X 3 (i.e. the Root Plate of a 10" DBH tree is  $10" \times 3 = 30"$ ). This is the radius from the outer edge of the tree, around the tree, which determines the perimeter limits of the trees Root Plate and the most critical area for anchoring. The City Forester will inspect the curb and walk being replaced as branded by the City Engineer to identify preservation measures (as listed below) or removals. Preservation measures should be communicated to contractors once identified and can be installed separate or in conjunction with one another on an individual basis. Contractors should then remove masonry work carefully and replace with as little disturbance as possible to existing roots. Roots within (6) inches of masonry to be replaced may be removed with a saw or pruning tool, however major scaffold roots within the trees Root Plate may be cut only with approval of the City Forester. All cut roots should be placed adjacent to the tree in which they belong to be inspected by the City Forester to determine future monitoring requirements.

The **Tree Preservation Measures** around sidewalk reconstruction include;

**Shaving lifted concrete:** Removing raised concrete to maintain minimum ADA compliance by reducing concrete thickness.

**Jog sidewalk:** By removing multiple slabs the sidewalk may be moved several feet away from scaffold roots and outside the root plate.

**Arc sidewalk:** Reducing sidewalk width but maintaining minimum ADA sidewalk width around scaffold roots or the root plate in an arc fashion.

**Ramp sidewalk:** Maintaining minimum required ADA sidewalk slope over scaffold roots that are at grade.

**5.2.10** Contractors shall notify the Project Inspector or the Engineering staff the same day of any damage to trees resulting from construction activities.

**5.2.11** Absolutely no concrete, slurry, gravel stone or other such materials shall be used as backfill directly around the tree.

**5.2.12** Where construction damage occurs, the City Inspector will consult with the City Forester to assess any damages or removals. The contractor's failure to follow the proper safeguards of these specifications shall result in cost recovery charges and liquidated damages to be assigned against the contractor as set using the latest revision of "*Guide for Plant Appraisal*" as published by the International Society of Arboriculture.

### **5.3 New Development Tree Planting and Removal**

In the development of new subdivisions or commercial property, the City Forester or City Engineer will review landscape plans provided by the developer and may require that, street trees be planted at developer's expense or payment in lieu of planting be made for any of the abutting streets, parking lots, parks and other public places before development takes place.

**Note: It is a violation of Wausau Municipal Code 12.56 for any person to perform work under a permit contrary to the permit terms and provisions of Wausau Municipal Code 12.56.080. A permit violator shall be responsible for the repair and replacement of any tree damaged or destroyed due to defective work or non-compliance.**

**5.3.1** The developer must submit a tree inventory of the area to be developed.

**5.3.2** The developer must submit a tree removal plan that shows exact trees to be removed.

**5.3.3** The developer will be required to replace trees based on the City of Wausau's replacement requirements or payment in lieu of per City of Wausau Comprehensive Fee Schedule.

**5.3.4** The developer must follow TPZ requirements for public trees outlined in Appendix D and illustrated in Figure 3 or provide a plan that specifies the method for protecting trees not listed for removal and the TPZ Plan must be approved by the City Forester or City Engineer.

### **5.4 Construction Tree Planting Soil Recommendations**

**5.4.1** An open boulevard is always the first choice for planting. However, tree grates may be used at openings for planting trees in hardscapes such as sidewalks or other paved areas that are high traffic areas or are required to meet American with Disabilities Act policy, provided an Engineered Root Space is provided for the growth of the tree. This should be done with the mutual consent of both the City Forester and the City Engineer.

**5.4.2** A minimum Engineered Root Space (Figure 4) shall be used in planting pits, continuous trenches, and in other areas as necessary in order to provide a sustainable growing environment for the roots of public trees.

**5.4.3** The City Forester may require changes to soil type, volume and opening required beyond the minimum engineered root space for the sustainability of specific tree types based on site characteristics and surrounding environment (Appendix F- Wausau Municipal Code 12.56.150 (3) Arboriculture Specifications and Standards). Exceptions to creating an engineered root space must be approved by the City Forester.

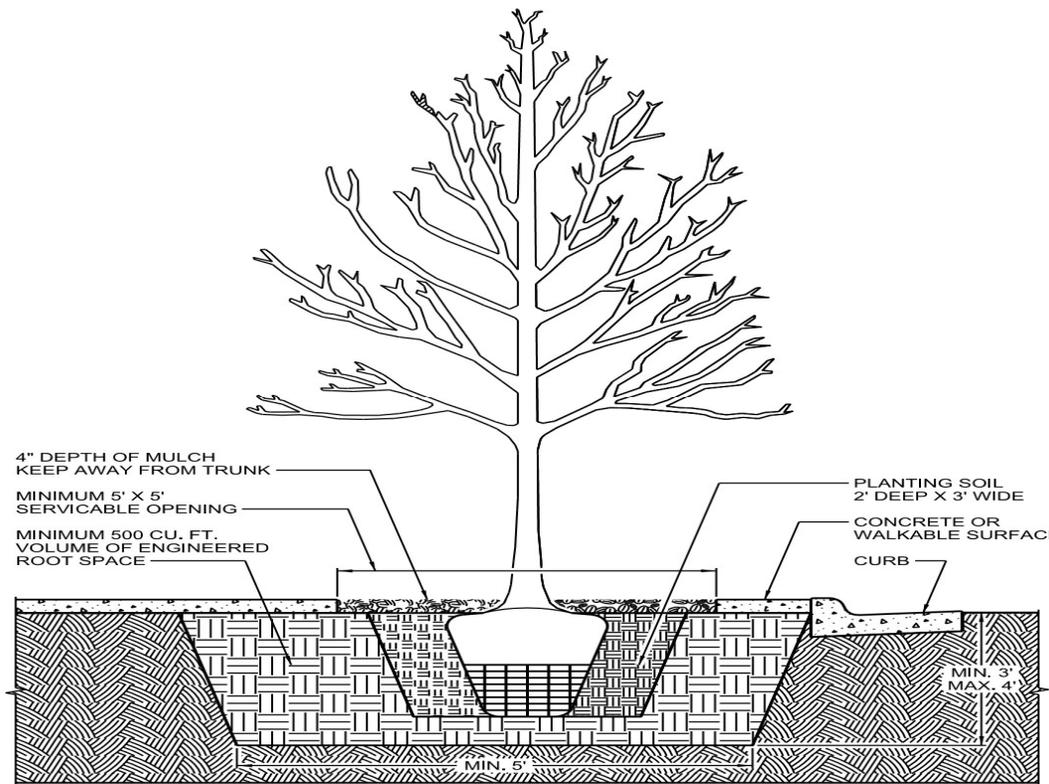


Figure 4 Minimum Engineered Root Space

### 5.5 Unimproved Street Plantings

Trees shall not be planted in the City right of way of unimproved streets or where no curb and gutter exist without approval from the City Engineer and City Forester.

### 5.6 Resident Boulevard Plantings

Residents or property owners who wish to plant trees in the City right of way are required to submit a free "Public Tree Permit Application" (Appendix E) to the Wausau/Marathon County Parks, Recreation and Forestry office prior to beginning work. The City Forester will review all applications with emphasis on planting the "right tree, in the right way, in the right place" and provide species options to meet urban forest goals.

**5.6.1 Trees, plants, or shrubs planted within any median or city right of way without the authorization and approval of the City Forester may be removed and the removal cost may be charged to the property owner.**

## **Section 6.0 Tree Removal Policy**

There are many factors that contribute to transforming a tree from an asset to a liability. They include: disease, decay, and mechanical damage, which can cause a tree to be structurally unsound, and therefore unsafe. It is the policy of the City to base tree removals on safety related criteria and liability.

### **6.1 Acceptable Reasons for Public Tree Removal**

A tree may be removed when the City Forester concludes that any of the following conditions exist:

1. Any dead or dying tree;
2. Any otherwise healthy tree, which harbors insects or diseases, which could reasonably be expected to seriously injure or harm any other tree;
3. Any tree which, by reason of location or condition, constitutes an imminent danger to the health, safety or welfare of the general public. In the category of dangerous or hazardous trees are those with observable, critical structural defects that could cause the tree to fail during periods of stress, i.e. wind or ice storms. Included are extensive rot or cavity formations, weak forks or crotches, utility repair and/or other characteristics that would impose an immediate liability to the City.

### **6.2 Dangerous Trees – Private Land**

Any private property tree which the City Forester, upon examination, finds to be infected or hazardous to the public or to city curb and gutter will be issued a (30) day written personal notice to remove or treat. Upon notice it is the responsibility of the property owner to remove or treat the tree. If the owner fails to comply the city shall remove such tree. Removal will be done using the lowest bid from approved city contractors and the cost will be assessed to the homeowner's property taxes.

**6.2.1** Upon City removal, employees shall keep an accurate record of the labor and cost of treatment of the tree(s). The record will then be reported to the City Finance Director, who shall upon request enter the cost against the property owner and shall be a charged upon the real property on which said tree or shrub is located pursuant to Section 66.0627 of the Wisconsin Statutes. (Ord. 61-5758 '1, 2018; Ord. 61-4202 '1(part), 1972.) (Appendix F- Wausau Municipal Code 12.56.110 Abatement of Nuisance). Note: the property owner may submit a written notice within 8 days to appeal the decision of the City Forester (Appendix F- Wausau Municipal Code 12.56.130).

### **6.3 Unacceptable Reasons for Public Tree Removal**

**NOT** included in the definition of a tree as a public nuisance or immediate hazard are the following:

1. Species of trees, that are in good health and structurally sound, currently listed on the Undesirable Species List (Appendix C);
2. Individual trees, regardless of species or kind, that pose either an imminent or potential hazard for which corrective actions can be taken;

3. Trees that constitute an inconvenience to the public by virtue of leaf, twig or fruit drop; that act as sources of allergies; that cause root blockage in sanitary or storm sewers; that inhibit or prevent the growing of turf beneath the canopy of the tree due to shading; that are subject to disease or insect problems, which cause only minor harm to trees;
4. Trees that constitute an inconvenience to the public by virtue of their location except those public trees that pose serious obstruction problems in terms of egress or access to private property or new construction projects. The removal of a public tree for purposes of accommodating private facilities will not be sanctioned unless the following conditions have been satisfied:
  - a. There are no other reasonable design alternatives.
  - b. The value of the tree(s) in question has been determined by the City of Wausau in accordance with the latest revision of "*Guide for Plant Appraisal*" as published by the International Society of Arboriculture.
  - c. **Before removal is authorized the property owner must compensate the City for the loss of the tree(s).**

#### **6.4 Unauthorized Removals**

If a tree is removed without prior Street Tree Permit Application (Appendix E) and written authorization from the City Forester or City Engineer, the City will need to be compensated for the tree's loss. The party removing the tree will be subject to a cost recovery charge and liquidated damages of the tree's value as determined using the latest revision of "*Guide for Plant Appraisal*" as published by the International Society of Arboriculture. Upon payment of the citation, the City may replace the street tree(s) at their discretion if the site is appropriate for replanting.

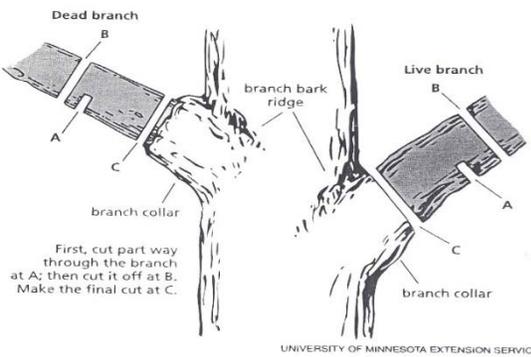
### **Section 7.0 Pruning Standards**

**All pruning shall follow the American National Standards Institute's *Standard Practices for Tree Care Operations-Pruning Objectives (ANSI A 300 (Part 1))* for the purpose of crown cleaning, crown thinning, crown raising, and structure development.** Reasons for pruning include reducing risk, improving or maintaining health, developing desired structure and appearance, preventing interference with the built environment, and other specific objectives. Street Tree Planting Permit Application (Appendix E) is required before any pruning is done by a resident or contractor on City owned and maintained trees.

#### **7.1 Pruning Cuts**

All final cuts shall be "collar cuts" made sufficiently close to the trunk or parent limb, without cutting into the branch collar or leaving a protruding stub, so that closure can readily begin under normal conditions. The face of the "collar cut" or wound area shall be circular in form. **"Flush" cuts to the main stem behind the branch collar and that leave oval exposed wounds shall not be made.** Cuts shall be clean and made such that all wound sides are even edged and do not leave "dog ear" ridges on one side or another.

**7.1.1** All limbs removed shall be cut in such a manner so as to prevent any ripping or tearing of the wood or bark on the parent or remaining stem. Large limbs shall be cut using the three-cut pruning method as shown in Figure 5. Limbs shall be brought to the ground as to prevent any damage to property, publicly or privately owned.



**Figure 5 Proper Pruning Techniques – 3 Cut Method**

## 7.2 Crown Cleaning

Crown cleaning should remove all dead, dying, diseased, crowded, weakly attached and low-vigor branches. Interior crowding and crossed or rubbing branches should be pruned where practical so as not to leave large holes in the general form of the tree. Trunk suckers and water sprouts, especially where they are present below the bottom 1/2 of the tree, should also be removed as part of crown cleaning. Suckers and sprouts that add to the shape of the tree above 14 feet may remain in mature trees that may not have an optimum crown or shape.

## 7.3 Crown Thinning

Crown thinning should selectively remove and/or prune branches back to large laterals to increase light penetration and air movement through the crown. After crown thinning, trees and branches shall have foliage and mechanical stress evenly distributed along a branch and throughout the crown. Not more than one-fourth of foliage on trees shall be removed unless approved by the City Forester. Species, growth, habitat and form need to be considered when thinning the crown, refer to the American National Standards Institute's *Standard Practices for Tree Care Operations-Pruning (ANSI A 300 (Part 1))*.

## 7.4 Crown Raising

Crown raising should remove lower branches where practical (dependent on tree size) to obtain an eventual full foliage height clearance of 14 feet on the street side of the tree. Work shall maintain the crown shape and symmetry typical of the species being pruned, and should balance the tree evenly. Raising should also allow an eventual clearance over the pedestrian walk (or resident side of tree) of 10 feet. **Pruning may include heading cuts on lower limbs or thinning cuts to lighten lower branch loads to achieve clearance if complete branch removal from the tree trunk is not practical.**

## 7.5 Clearance Pruning

Clearance of houses and buildings should be such that branches are a minimum of (6) years typical growth from rooftops. Trees and other vegetation shall be pruned to maintain a clear line of sight when approaching all traffic control devices and intersections.

## 7.6 Tools

Proper tools such as hand pruners, pole saws, handsaws, and chain saws shall be used for each cut. The cutting edge of each tool shall be positioned to obtain a proper pruning cut so it will not cut, rip, or harm adjacent bark areas. At no time shall any person working in trees for pruning purposes, wear spurs or any other footwear which, in the opinion of the City Forester, may injure the tree being pruned.

### **7.7 Site Appearance and Clean Up**

Pruned limbs and branches temporarily placed in a public area shall be placed in such a manner as to eliminate any obstruction to motor vehicles and pedestrians. Site cleanup shall include removal of large twigs, chips, leaves and limbs from the street, curb, terrace, sidewalk, private lawns and driveways with the appropriate tools for the job.

### **7.8 Topping**

**It is an unacceptable practice to top any public tree in the City and it is not recommended for any private tree.** Topping is the indiscriminate cutting back of tree branches to stubs or lateral branches that are not large enough to assume the terminal role of growth. Topping, however, is not a viable method of height reduction and will make a tree more hazardous in the long term by encouraging excessive growth and extensive decay.

**7.8.1** Topping trees for utility clearance purposes should not be the standard operating procedure. Pruning trees for line clearance is necessary and understandable. However, proper pruning cuts need to be made and only those limbs necessary for proper clearance should be pruned. Trees located under utility lines that require excessive pruning or pruning needs beyond what is acceptable for proper pruning, should be considered for outright removal and replaced with a suitable tree species for under utility lines. Topping trees is not an acceptable method of pruning under any circumstances and should not be done by City personnel, homeowners or contracted services to any tree or part of within the City right of way.

**7.8.2** Trees damaged by storms or other causes, or trees under utility lines or other obstructions where other pruning practices are not practical may be exempt from these specifications as deemed by the City Forester.

### **7.9 Timed Pruning to Avoid Spread of Disease**

**7.9.1 Oak, Elm, and Fruit Trees** In an effort to minimize the spread of disease should not be pruned from April 15th to September 1<sup>st</sup>. Trees damaged by storms or other causes during this time may be pruned after authorization from the City Forester. Final pruning cuts should be made in dormant season to remove the stub.

### **7.10 Wound Dressings**

Under normal circumstances, wound dressings or pruning paints shall not be applied to pruning cuts. Research has shown that they may actually interfere with the protective benefits of tree gums and resins, and prevent wound surfaces from closing as quickly as they might under natural conditions.

## **Section 8.0 Miscellaneous Maintenance Practices**

### **8.1 Stump Removal**

The stumps of all removed trees shall be ground to a depth of at least eight inches (8”) below the surrounding ground level. The excess stump chips shall be removed, the hole filled with clean topsoil, and the site graded and seeded. All costs associated with stump removal shall be borne by whoever bears the cost of tree removal.

## **8.2 Fertilization**

The City does not, in general, fertilize public trees. A resident who wishes to fertilize the boulevard tree(s) adjacent to their property shall request written permission from the City. The City Forester has the authority to approve or deny a fertilization request. All fertilization shall adhere to the American National Standards Institute’s *Standard Practices for Tree Care Operations – Fertilization (ANSI A 300 (Part 2))*.

## **8.3 Cabling and Bracing**

Tree support systems are used to provide supplemental support to leaders, individual branches, and/or entire trees by limiting their movement. When a tree has a structural defect or condition that poses a high risk of failure, a supplemental support system can often reduce the risk. **However, not all potential hazards can be mitigated by their installation and cabling and bracing will be prohibited in terraces.** It is essential that each tree be carefully examined for risk of failure by a qualified arborist to ensure that the system will achieve its objective of providing added support, without increasing the risk of tree failure.

**8.3.1** As a general rule, cables should be located above the crotch at a point approximately two-thirds (2/3) of the distance between the crotch and tops of the branch ends. Static support systems should use rust-resistant cables, thimbles and lags. Thimbles must be used in the eye splice in each end of the cable. Under no circumstances shall cable be wrapped around a branch. Installation of dynamic support systems shall be installed according to manufacturer specifications. All cabling and bracing practices shall follow the American National Standards Institute’s *Standard Practices for Tree Care Operations – Support Systems, Cabling, Bracing, and Guying (ANSI A300 (Part 3))* and the International Society of Arboriculture’s companion publication *Best Management Practices – Tree Support Systems: Cabling, Bracing, and Guying (2014)*.

## **8.4 Spraying**

The City, in general, limits the use of pesticides on its public trees. Applications may be done for the control of specific diseases or insects with the proper timing and materials to obtain the desired level of control. Suitable precautions shall be taken to protect and warn the public that spraying is being done. All application practices shall conform to the appropriate State and Federal regulations.

**8.4.1** A resident who wishes to apply pesticides to the terrace tree(s) adjacent to their property shall request written permission from the City. The City Forester has the authority to approve or deny a pesticide application request. Residents applying for permission to apply pesticides must submit the following information: type of pesticide, timing (weeks(s) to be applied), quantity to be used, application method, and reason for pesticide use. If the application is done by a commercial contractor or is a restricted use pesticide (RUP), proof of a valid Wisconsin Department of Agriculture Trade and Consumer Protection Commercial Applicator License Number is also required.

## **Digger’s Hotline and Local Utilities**

Digger's Hotline (800-242-8511) and all appropriate local utility companies must be notified prior to any underground excavation, including but not limited to: tree planting, stump removal and root repair. Three business days are customarily required as sufficient notice for the processing of locates. Proper marking of excavation sites prior to calling ensures that no resident, employee or utility are at risk from damage to unmarked utilities. Work within 18" of any underground utility requires hand digging to expose the facility and prevent unnecessary damage to utilities. Private utilities (i.e. irrigation, pet fences, private lighting etc.) located within the public right-of-way shall be marked by the adjacent property owner at their expense. The City cannot assume responsibility for any damage as a result of unmarked private utilities in the right of way as they are prohibited.

## References

American National Standards Institute. *American National Standards for Arboricultural Operations-Pruning, Repairing, Maintaining and Removing Trees, and Cutting Brush-Safety Requirements* (Z133.1-2017). International Society of Arboriculture, Champaign, IL.

American National Standards Institute. *American Standard for Nursery Stock*, (Z60.1-2014). American Nursery and Landscape Association, Columbus, OH.

American National Standards Institute. *American National Standards for Tree Care Operations-Tree, Shrub, and Other Woody Plant Maintenance-Standard Practices (Pruning)* (A300, Part 1-2017). National Arborist Association, Manchester, NH.

American National Standards Institute. *American National Standards for Tree Care Operations-Tree, Shrub, and Other Woody Plant Maintenance-Standard Practices (Fertilization)* (A300, Part 2-2018). National Arborist Association, Manchester, NH.

American National Standards Institute. *American National Standards for Tree Care Operations-Tree, Shrub, and Other Woody Plant Maintenance-Standard Practices (Support Systems a. Cabling, Bracing, and Guying)* (A300, Part 3-2013). National Arborist Association, Manchester, NH.

American National Standards Institute. *American National Standards for Tree Care Operations-Tree, Shrub, and Other Woody Plant Maintenance-Standard Practices (Post-Planting Care)* (A300, Part 6-2018). National Arborist Association, Manchester, NH.

Council of Tree and Landscape appraisers, 2018. *Guide for Plant Appraisal*. International Society of Arboriculture, Champaign, IL. 170 pp.

Smiley, E.T. and S. Lilly. 2014. *Best Management Practices Tree Support Systems: Cabling, Bracing and Guying*. International Society of Arboriculture, Champaign, IL. 50 pp.

**APPENDIX A - SMALL TREE PLANTING LIST**  
 SPACING: Minimum  $\frac{3}{4}$  of the Maximum Crown Spread

BOULEVARD OR MEDIAN WIDTH: 4-5'

Common Name	Cultivars	Max Crown Spread (W)	Special Notes
Callery Pear	Chanticleer	W=30'	Very Tolerant H=40'
Crabapple	Pinkspire Spring Snow Royal Raindrops Velvet Pillar	W=20'	Small Fruit  H=25'
Hawthorn	Cockspur Winter King	W=30'	Spring planting only -Thornless -Few Thorns H=30'
Ironwood		W=30'	Plant in partial shade H=20'
Japanese Tree Lilac	Beijing Gold Ivory Silk Summer Charm	W=15'	Tolerant  H=20'
Maackia Amur	Starburst Summertime	W=30'	Tolerant to dry, alkaline soils. Intolerant of salt spray H=30'
Magnolia	Merrill	W=30'	Flowering H=40'
Pear	Flowering Prairie Gem	W=20'	Fruitless to small rounded pome. H=25'
Serviceberry	Autumn Brilliance	W=20'	-Single Stem Only 3/8" berries H=25'
Tatarian Maple	Hot Wings Summer Splendor	W=20'	Very tolerant  H=25'

**APPENDIX B - LARGE TREES PLANTING LIST**

**SPACING: Minimum  $\frac{3}{4}$  of the Maximum Crown Spread**

**BOULIVARD WIDTH: 5' MINIMUM**

<b>Common Name</b>	<b>Cultivars</b>	<b>Max Crown Spread (W)</b>	<b>Special Notes</b>
Manchurian Alder	Prairie Horizon	W=30'	Drought Tolerant H=40
Buckeye	Autumn Splendor Prairie Torch	W=30'	Tolerant of Soil Type and PH H=35'
Kentucky Coffeetree	Espresso Prairie Titan Stately Manor	W=50'	Seedless Cultivars, Very Tolerant  H=70'
Amur Cork Tree	Macho His Majesty	W=50'	Some Drought Tolerance, Seedless Cultivars H=45'
Elm	Homestead New Horizon Patriot Princeton Prospector Regal Triumph	W=50'	Cultivars Resistant To Dutch Elm Disease      H=60'
Ginkgo	Autumn Gold	W=30'	Fruitless Cultivar H=50'
Hackberry	Chicagoland	W=50'	Native H=60'
Honeylocust	Skyline Shademaster	W=50'	Thornless cultivars  H=70'
Linden	Glenleven Greenspire Redmond	W=30'	OVER 10% city wide distribution

	Shamrock		H=50'
Maple		W=50'	OVER 10% city wide distribution
Maple (cont.)	Autumn Blaze Autumn Spire Burgundy Bell Emerald Lustre Northwood Red Sunset Sienna Glen Shangtung Sugar Maple	(cont.) W=50'	H=60' (cont.) OVER 10% city wide distribution.  H=60'
Northern Catalpa		W=40'	Long seed pods H=60'
Oaks	Beacon (columnar) Heritage Northern Red Pin Regal Prince (columnar) Swamp White	W=15' W=50' W=50' W=50' W=15' W=50'	H=40' H=80' H=75' H=70' H=40' H=60'
River Birch (single stem)		W=50'	H=60'
Turkish Filbert		W=30'	Tolerant once established H=50'
Spruce	Black Hills White Norway	W=20' W=20' W=30'	ONLY -Parks or Open Space H=40' H=60' H=60'
Tamarack		W=50'	ONLY -Parks or Open Space H=70'
Pine	White Red	W=40' W=40'	ONLY -Parks or Open Space H=80' H=80'

## APPENDIX C - UNDESIRABLE SPECIES

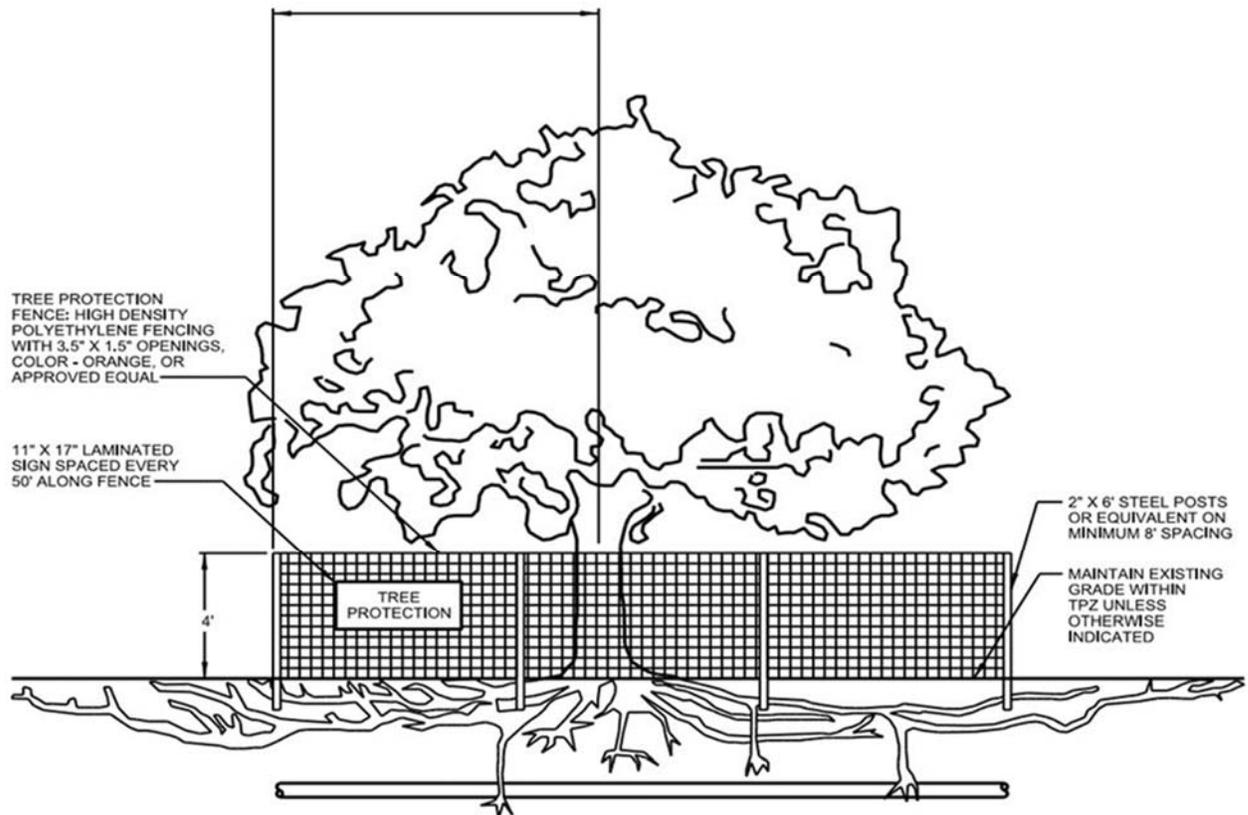
<u>Scientific Name</u>	<u>Common Name</u>	<u>Problem(s) or Limitation(s)</u>
<i>Acer negundo</i>	Boxelder	Weak wooded, female attracts the Boxelder bug.
<i>Acer saccharinum</i>	Silver Maple	Weak wooded, susceptible to storm damage, aggressive root system
<i>Alianthus altissima</i>	Tree of Heaven	Weak wooded
<i>Eleagnus angustifolia</i>	Russian olive	Invasive
<i>Fraxinus spp.</i>	Ash	Susceptible, Emerald Ash Borer
<i>Populus alba</i>	White Poplar	Roots block sewers, weak wooded, cotton type seeds
<i>Populus nigra italicia</i>	Lombardy Poplar	weak wooded
<i>Rhamnus pseudacaia</i>	Buckthorn	Invasive
<i>Robina spp.</i>	Black Locust	Shallow rooted, borers
<i>Ulmus pumila</i>	Siberian Elm	Weak wooded
<i>Ulmus Americana</i>	American Elm	Disease prone (Dutch Elm)

## APPENDIX D - TREE PROTECTION ZONE (TPZ)

### NOTES:

- SEE SPECIFICATIONS FOR ADDITIONAL TREE PROTECTION REQUIREMENTS.
- TREE PROTECTION FENCE MUST BE MAINTAINED UNTIL COMPLETION OF WORK.
- NO TREE PRUNING SHALL BE DONE EXCEPT BY CITY OF WAUSAU PRUNING PERMIT.
- NO STORAGE OF MATERIALS OR OPERATION OF EQUIPMENT MAY TAKE PLACE INSIDE TPZ.
- CONTRACTORS MAY ONLY OPEN TRENCH WITH APPROVAL FROM CITY FORESTER.

TREE PROTECTION ZONE  
RADIUS EQUALS 1' FOR  
EACH 1" OF TRUNK  
DIAMETER MEASURED AT  
4.5' ABOVE GRADE.  
MODIFIED -TPZ REQUIRES  
PRIOR APPROVAL.



**APPENDIX E – PUBLIC TREE PERMIT APPLICATION**

**CITY OF WAUSAU**



**PUBLIC TREE PERMIT APPLICATION**

REQUIRED PER WAUSAU MUNICIPAL CODE 12.56.080

NAME or BUSINESS: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

CITY: \_\_\_\_\_ ZIP: \_\_\_\_\_ PHONE: \_\_\_\_\_

Application to (circle one): PLANT PRUNE REMOVE PESTICIDE TREATMENT

Description of public tree location and work to be performed:

\_\_\_\_\_  
\_\_\_\_\_

SPECIES PLANTING: \_\_\_\_\_

Illustrate Location

If permit is granted, I hereby agree that any and all work will be performed in accordance with the City of Wausau Tree Planting and Preservation Specifications Manual and that all costs associated with such work will be my responsibility.

Property Owner's Signature X \_\_\_\_\_ Date \_\_\_\_\_

Public Tree Permit has been:  GRANTED  DENIED

FORESTRY DEPARTMENT X \_\_\_\_\_ Date \_\_\_\_\_

If permission has been denied, state reason:

\_\_\_\_\_  
\_\_\_\_\_

After completing this form, please return to the Wausau and Marathon County Parks, Recreation, and Forestry Department, 212 River Dr. #2, Wausau, WI 54403, Phone: (715) 261-1550. Upon approval, a copy of the permit will be returned to you.

**Call Digger's Hotline 72 Hours Before You Dig. – (800) 242-8511**

## APPENDIX F- Wausau Municipal Code Chapter 12.56 STREET TREES

### Sections:

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12.56.010 Purpose.

12.56.020 Definitions.

12.56.030 City forester.

12.56.040 Damage to trees and shrubs.

12.56.050 Fastening materials to trees and shrubs.

12.56.060 Permit to move buildings on streets.

12.56.070 Permit to public utilities.

12.56.080 Permit to plant, remove, maintain and protect trees and shrubs.

12.56.090 Power to plant, remove, maintain and protect trees and shrubs.

12.56.100 Public nuisance.

12.56.110 Abatement of nuisance.

12.56.120 Interference with the city forester.

12.56.130 Appeal from order of city forester.

12.56.140 Master street tree plan.

12.56.150 Arboricultural specifications and standards.

12.56.160 Dutch elm disease.

12.56.170 Authority of city forester to enter private premises.

12.56.180 Severability.

12.56.190 Cost of planting, removing, maintaining and protecting trees and shrubs.

**12.56.010 Purpose.** It is the policy of the city to regulate and control the planting, removal, maintenance, and protection of trees and shrubs in the city; to eliminate and guard against dangerous conditions which may result in injury to persons using the public areas of the city; to promote and enhance the beauty of the city; to prevent damage to any public sewer or water main, street, sidewalk, or other public property; to protect trees and shrubs located in public areas from undesirable and unsafe planting, removal, maintenance, and protection practices; and to guard all trees and shrubs within the city against the spread of disease or pests. The provisions of this chapter shall apply:

(a) To all trees and shrubs presently or hereafter planted in or upon any public area; and

**(b) To all trees and shrubs presently or hereafter planted in or upon any private premises which shall endanger the life, health or safety of persons or property. (Ord. 61-4202 '1(part), 1972.)**

**12.56.020 Definitions. (a) “Public Way” includes all public streets, roads, boulevards, alleys and sidewalks.**

**For statutory provisions defining the powers and duties of the city forester, see ' 27.09, Wis. Stats. As to the removal of fallen trees from highways, see ' 86.03, Wis. Stats.**

**(b) “Public Area” includes all public ways, parks, and other lands owned or leased by the city.**

**(c) “Trees and/or Shrubs” includes all woody vegetation presently or hereafter planted on any public area.**

**(d) “Maintenance” and “Protection” include all operations of: trimming, pruning, spraying, injecting, fertilizing, treating, bracing, doing surgery work, cutting above or below ground. (Ord. 61-4202 '1(part), 1972.)**

**12.56.030 City forester. (a) Appointment: The Wausau park and recreation committee may employ a city forester (' 27.09, Wis. Stats.).**

**(b) Powers and Duties: The city forester shall have the following general powers and duties:**

**(1) To direct, manage, supervise, and control the city street tree program to include all planting, removal, maintenance, and protection of all trees and shrubs on all public areas; to supervise park department personnel in the planting, removal, maintenance, and protection of said trees and shrubs.**

**(2) To guard all trees and shrubs within the city so as to prevent the spread of disease or pests and to eliminate dangerous conditions which may affect the life, health or safety of persons or property.**

**(3) Such other powers and duties as are provided by the laws of Wisconsin, particularly Sections 27.08 and 27.09 of the Wisconsin Statutes; by ordinances of the city; and by the Wausau park and recreation committee.**

**(Ord. 61-5339 '5, 2007, File No. 07-0718; Ord. 61-4202 '1(part), 1972.)**

**12.56.040 Damage to trees and shrubs. No person shall in any public area of the city: break, injure, mutilate, kill, or destroy any tree or shrub; permit any animal under his control to do so; permit any fire to injure any portion of any tree or shrub; permit any leak to exist in any gas line within the root zone of any tree or shrub; permit any toxic chemical to seep, drain, or be emptied on or about any tree or shrub; or permit electric wires to come in contact with any tree or shrub. During building operations, the builder shall erect suitable protective barriers around public trees and shrubs which may be injured, after first giving written notice to the city forester. (Ord. 61-4202 '1(part), 1972.)**

**12.56.050 Fastening materials to trees and shrubs. No person shall fasten any sign, rope, wire, or other materials to or around or through any public trees or shrub without obtaining a written permit from the city forester, except in emergencies such as storms or accidents. (Ord. 61-4202 '1(part), 1972.)** 12.56.060 Permit to move buildings on streets. For provisions relating to moving buildings, see Chapter 15.40 of this code. (Ord. 61-4202 '1(part), 1972.)

**12.56.070 Permit to public utilities. No permit shall be issued by the city for the installation of public utilities until it is endorsed in writing by the city forester. When a permit is given by the city forester to a telephone, telegraph, electric power, gas or other public service corporation or utility to trim trees or perform other operations affecting trees or shrubs, the amount or extent of such work shall be limited to the actual necessities of the services of the company and such work shall be done in a neat and professional manner and according to the arboricultural specifications and standards set forth in the written permit. The city forester may assign an inspector to supervise the work performed under the permit. The expense of such service shall be charged to the permittee at the usual city rate. (Ord. 61-4202 '1(part), 1972.)**

**12.56.080 Permit to plant, remove, maintain and protect trees and shrubs. No person shall plant trees or shrubs in any public area unless a written permit is first obtained from the city forester. No person shall trim, prune, remove, treat, spray, inject, fertilize, brace, do surgery work, cut above or below ground, or otherwise disturb any tree or shrub in any public area without**

obtaining a written permit from the city forester. The permittee shall adhere to the arboricultural specifications and standards of workmanship set forth in the permit. A permit shall not be required to water trees and shrubs. (Ord. 61-4202 '1(part), 1972.)

**12.56.090 Power to plant, remove, maintain and protect trees and shrubs.** The city forester shall have the authority to plant, remove, maintain, and protect trees and shrubs on all public areas as may be necessary to ensure safety or preserve the symmetry and beauty of such grounds. (Ord. 61-4202 '1(part), 1972.)

**12.56.100 Public nuisance.** Any tree or shrub or part thereof growing upon private or public property which is:

(a) Interfering with the use of any public area;

(b) Infected with an infectious plant disease;

(c) Infested with injurious insects;

(d) Injurious to public improvements; or

(e) Endangers the life, health, or safety of persons on public property is declared a public nuisance. (Ord. 61-5627 '1(part), 2014, Ord. 61-4202 '1(part), 1972.)

**12.56.110 Abatement of nuisance.** (a) **Trees and Shrubs on Public Areas.** If the city forester determines, with reasonable certainty upon inspection or examination, any nuisance tree or shrub, as herein defined, exists in or upon any public area in the city, he shall immediately cause it to be treated, trimmed, removed, or otherwise abated in such manner as to destroy or prevent the spread of the nuisance. The manner in which the nuisance shall be abated, shall be determined by the city forester.

(b) **Trees and Shrubs on Private Premises.** If the city forester determines with reasonable certainty upon inspection or examination that any nuisance tree or shrub, as herein defined, exists in or upon any private premises, he shall in writing notify the owner or tenant having charge of such premises. Within thirty days after the issuance of said notice, said person shall cause the treatment, trimming, or removal and destruction of said nuisance tree or shrub as directed in the written notice. No damage shall be awarded the owner for the destruction of trees or shrubs destroyed pursuant to

**this chapter. In case the owner or tenant having charge of such premises shall refuse or neglect to comply with the terms of the written notice within thirty days after receiving it, the city forester shall cause the removal, treatment, or trimming of said nuisance tree or shrub. The expense thereof shall be a charge upon the real property on which said tree or shrub is located pursuant to Section 66.0627 of the Wisconsin Statutes. (Ord. 61-5758 '1, 2018; Ord. 61-4202 '1(part), 1972.)**

**12.56.120 Interference with the city forester. No person shall prevent, delay, or interfere with the city forester or his assistants in the execution or enforcement of this chapter. (Ord. 61-4202 '1(part), 1972.)**

**12.56.130 Appeal from order of city forester. A person who objects to all or a part of an order or decision of the city forester may, within eight days of receipt thereof, notify the park and recreation committee and the city forester, in writing, of the nature of the objection and request a hearing thereon. Upon receipt of such objection, the city forester shall stay the order or work pending the outcome of the appeal process. Within eight days of the receipt of such notice of appeal, the park and recreation committee shall schedule a hearing before the committee or its designated subcommittee to hear the objection. The hearing shall be held within eight days of notice to the appellant. The city forester shall be present at such hearing. The appellant is entitled to be represented by counsel at appellant's expense. Within eight days after such hearing, the park and recreation committee shall, in writing, notify the appellant and the city forester of its decision. The park and recreation committee may affirm, cancel or modify the order, in its discretion, to best conform such order to the intent of this chapter and make its report thereon to the common council. If the appellant objects to the decision of the park and recreation committee, the appellant may, within eight days of receipt thereof, notify the city clerk, in writing, of the nature of the objection and request a hearing before the common council thereon. The council may adopt, reject or amend the park and recreation committee's recommendation. The city clerk shall notify the appellant, park and recreation committee, and city forester, in writing, of the council's decision. (Ord. 61-5627 '2(part), 2014; Ord. 61-4290 '1, 1975.)**

**12.56.140 Master street tree plan. The master street tree plan shall consist of city-wide, street-by-street written evaluation of all space and site factors which will aid in the determination of the tree species best suited to a particular planting site in regard to growth habits, shape, form, health, disease and pest resistance, conflicts with wires, lights, pavement, traffic, pedestrians, sidewalks, environmental pollution, sewers and space availability. The evaluation of the space and site factors**

and the species selection for a particular street shall be made by the city forester. (Ord. 61-4202 '1(part), 1972.)

**12.56.150 Arboricultural specifications and standards.** The following specifications and standards are established for the planting, trimming, and removal of trees and shrubs in the streets, parks and public places of the city:

**(a) Planting:**

**(1) All trees will be not less than one inch in diameter of trunk, at six inches above ground level.**

**(2) No tree shall be planted closer than two feet from the curb line or outer line of the sidewalk. All trees shall be planted in line with each other and at a spacing of between forty and sixty feet from each other depending on the species of the tree. The exact planting location of each tree and shrub shall be determined by the city forester.**

**(3) Where the soil is of poor quality, good soil shall be provided in an amount sufficient to insure proper growth.**

**(4) The following species and varieties are prohibited for planting on the boulevards of public streets in the city: female trees of the genus Populus and female trees of boxelder.**

**(5) No tree shall hereafter be planted at or within twenty feet of an intersection.**

**(b) Trimming:**

**(1) All trees and shrubs, on public or private property, which have branches overhanging a public street, shall have said branches trimmed to a clearance height of fourteen feet; all trees and shrubs, on public or private property, which have branches overhanging a public sidewalk, shall have said branches trimmed to a clearance height of ten feet. The city forester may waive the provisions of this section for newly planted trees if he determines they do not interfere with public travel, obstruct the light of any street light, or endanger public safety. Any tree or shrub not trimmed as herein provided shall be subject to the provisions of section 12.56.110.**

**(2) All saw cuts exceeding one inch in diameter shall be waterproofed with proper paint.**

**(3) All dead wood, stubs, broken branches, badly formed branches, disease infected and insect infested branches and branches interfering with public travel, lighting, existing buildings, and traffic signs shall be removed during the trimming operation, with consideration given to the symmetry and beauty of the tree or shrub.**

**(c) Removing:**

**All public trees and shrubs which are marked for cutting shall be completely removed from the growing site and disposed of in an authorized manner. The stump shall be ground out to a depth suitable for future planting of trees or turf. (Ord. 61-4202 '1(part), 1972.)**

**12.56.160 Dutch elm disease. (a) Public Nuisances Declared. The common council having determined the health of the elm trees within the city is threatened by a fatal disease known as Dutch elm disease@ declares the following to be public nuisances:**

**(1) Any living or standing elm tree or part thereof infected with the Dutch elm disease fungus *Ceratocystis ulmi* (Buisman) Moreau or which harbors any of the elm bark beetles *Scolytus multistriatus* (Eichh) or *Hylurgopinus rufipes* (Marsh);**

**(2) Any dead elm tree or part thereof, including logs, branches, stumps, firewood or other elm material not buried, burned, sprayed with an effective elm bark beetle destroying insecticide, or from which the bark has not been removed.**

**(b) Nuisances Prohibited. No person shall permit any public nuisance as defined in subsection (a) of this section to remain on any premises owned or leased by him within the city.**

**(c) Abatement of Dutch Elm Disease Nuisance. Abatement of Dutch elm disease nuisance shall be pursuant to section 12.56.110. (Ord. 61-4202 '1(part), 1972.)**

**12.56.170 Authority of city forester to enter private premises. The city forester or his representatives, after giving advance notice to the owner or tenant having charge, shall have the authority to enter upon private premises at reasonable times for the purposes of examining or inspecting any suspected nuisance tree or shrub. All nuisance trees and shrubs to be removed under**

the provision of section 12.56.110 may be appropriately marked by the city forester. (Ord. 61-4202 '1(part), 1972.)

**12.56.180 Severability.** If any provision of this chapter is declared invalid or unconstitutional by any court of competent jurisdiction, such declaration shall not invalidate any other provision of this chapter. The common council of the city declares they would have adopted each and every provision of this chapter separately regardless of the possible invalidity of any part thereof. (Ord. 61-4202 '1(part), 1972.)

**12.56.190 Cost of planting, removing, maintaining and protecting trees and shrubs.** The entire cost of planting, removing, maintaining, and protecting trees and shrubs on all public areas of the city, when done by park department employees or their contractors at the direction of the city forester, shall be borne by the city out of the park department budget. When a permit is issued by the city forester to plant, remove, maintain or protect trees and shrubs, pursuant to sections 12.56.070 and 12.56.080, the permittee shall incur all expenses. (Ord. 61-4202 '1(part), 1972.)



**TO:** Park & Recreation Committee

**FROM:** Eric Lindman, P.E.  
Director of Public Works & Utilities

**DATE:** October 07, 2019 – Park & Rec Committee

**SUBJECT:** Riverside Park – Citizens for a Clean Wausau; Request Access for Soil Testing

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**Citizens Request and City Requested Information**

Citizens for a Clean Wausau (CCW) have requested the City allow them access to Riverside Park to complete their own testing. Attached you will find their formal request letter. According to their request, CCW would like to complete up to 3 soil tests in Riverside Park at their expense using Sand Creek Consultants. Sand Creek Consultants is the firm previously hired by CCW to complete the testing on City owned property along the Thomas Street corridor.

Based on the request by CCW the City is requesting the following information from CCW, which is comparable to the information the City requested when CCW completed the previous round of soil testing along the Thomas Street corridor:

1. CCW or their consultant will need to provide a detailed scope of services to be completed by CCW or their consultant.
2. CCW will need to confirm whether they intend to complete a risk assessment of the results, similar to what the City had conducted on previous testing. If so, this assessment should be incorporated into the scope of services.
3. The City will require a Hold Harmless Agreement, which the City will prepare. CCW and their consultant will be required to sign prior to completing any work on City-owned property.
4. The City will require that the contractor hired to complete the work is licensed and adequately insured and they will need to provide proof of both to the City.
5. The City requests the testing results be submitted to the WDNR directly once CCW receives the results. This should be incorporated into the scope of services.

The following additional questions have come up related to CCW moving forward with completing the newly requested testing:

1. Has CCW requested to complete any testing on privately owned land? Either on private residential property or on industrial property in the area?
2. If the CCW completes the proposed three soil tests in the park does CCW consider this sufficient testing at this time and will not request the City to perform additional testing?

It is important CCW answer and/or acknowledges the above questions/statements so the City Council has a complete knowledge of the scope and intent of work to be completed.

### **Potential City Legal Liability - Considerations Prior to Final Decision**

There are potential liability concerns the Committee and City Council members need to consider prior to making a final decision on allowing CCW or any other private entity to complete this type of work on City owned property. The City Attorney along with outside environmental legal counsel experts have prepared the following information so you may make a fully informed decision.

If the WDNR does not require any further testing by Wauleco in the park in connection with its open remediation BRRTS case at the neighboring site, and the City or CCW (Citizens for a Clean Wausau) perform testing within the park and identify exceedances, then the City as owner of the park property will be bound by the notification and responsibility provisions of Ch. 292, which include a requirement to report those exceedances to the WDNR.

The provisions of Ch. 292, Wis. Stats., entitled “Remedial Action,” address the City’s obligations and liability with respect to environmental contamination that has migrated from another property. As an off-site, affected property owner (of Riverside Park), the City is not at this time required by the WDNR to investigate and clean up the source of any contamination in Riverside Park. The party responsible for the contamination’s source (in this case, Wauleco), according to the attached publication, is required to take action to address health and safety concerns at both the source property and the off-site property.

When contamination migrates from the source and affects another unrelated property, the law provides an exemption for the owner of an affected, neighboring property from the requirement to take certain statutory response actions (“off-site liability exemption”).

However, the City would have to prove it meets all of the exemption criteria contained in the statute. s. 292.13, Wis. Stats. This would come at a cost to the City. The City would likely need to engage a technical consultant of its own to prepare the notification and explanatory submittals to best explain why the typical investigation and remediation obligation and process should not be imposed upon the City. The City may also bear the burden of connecting any identified exceedances found to the Wauleco site and the open BRRTS case.

If that were not possible and the exemption criteria could not be met, the City, as the owner, would have liability to take action and potentially be required to conduct additional extensive sampling to define the extent of exceedances and to restore the environment to the extent practicable and minimize harmful effects, pursuant to s. 292.11(3), Wis. Stat.

September 23, 2019



**VIA EMAIL**

Mayor Robert B. Mielke  
City Hall  
407 Grant Street  
Wausau, WI 54403

RE: Access to Riverside Park for Professional Environmental Soil Testing

Dear Mayor Mielke:

As you know, Citizens for a Clean Wausau (CCW) is a grassroots environmental group in Central Wisconsin. CCW is comprised of volunteers and works primarily on issues related to defining the extent and nature of industrial contamination in a footprint on Wausau's southwest side, so that it can and will be remediated. We are writing now in regard to ongoing discussion over testing in Riverside Park.

The City's consultant, REI, has recommended testing of the Park and, in a September 6, 2019 submittal to the Parks & Recreation Committee, CCW has provided comments on where and how those samples should be collected. A copy of that submittal is attached. Unfortunately, recent statements have been made by, or on the behalf of, the City of Wausau to suggest that the City does not intend to follow through on testing this year, including:

- The City will wait to determine if its own environmental testing will be done in Riverside Park until after it has received and reviewed the report in November from the WAULECO/TRC air deposition study (this is the study which includes only one soil sample from the vast park)
- It is too early for the City to do testing this fall and it may not occur this year

While CCW also looks forward to the results of the Wauleco testing, considering there is only one sample being taken within the Park and in a location that will not address the run-off concerns associated with the culvert area, we urge the City to proceed with its own testing and grant CCW access to collect samples. At its own cost and expense, CCW proposes to collect up to 3 samples within the areas previously identified. Our intent would be to enlist the services of Sand Creek Consultants to collect those samples since they are the ones who have collected samples from the neighborhood in the past. We would also intend to use the same lab and analytical methods previously used by Sand Creek.

Given that the City of Wausau granted access to Sand Creek to collect samples along Thomas Street in early 2018, we presume it will be simple and swift to use a similar access agreement modified for this specific park property and timeframe.

We would appreciate a response to this request without delay so that samples can be collected in October.

Thank you for your continued assistance in safeguarding the welfare of our local environment and those who live within it.

Very sincerely,

Tom Kilian  
Spokesperson, Citizens for a Clean Wausau

**Attachment**

cc: Ms. Anne Jacobson, City Attorney (via email)  
Ms. Toni Rayala, City Clerk (via email)



**TO:** Park & Recreation Committee

**FROM:** Eric Lindman, P.E.  
Director of Public Works & Utilities

**DATE:** October 07, 2019 – Park & Rec Committee

**SUBJECT:** Riverside Park – Proposed Testing (Fourth Proposal)

The Park & Recreation Committee has been discussing potential soil testing in Riverside Park, as requested by Citizens for a Clean Wausau (CCW), since March 2019. This has been an item on the Park and Recreation Committee’s agenda every month. Since the initial discussions, there have been four different proposals presented for a varying number of sampling locations and the proposed cost of that field work and associated laboratory analysis. The Park & Recreation Committee, at their July meeting, requested CCW to submit where they wanted testing performed and what type of analysis they would like completed. The Committee asked again in September and, in response, CCW provided a map with 7 locations within Riverside Park and requested that Dioxin/Furan testing be completed. The request is attached.

This memo outlines a summary of the multiple testing proposals which have been discussed at the Park & Recreation Committee. The first three proposals were prepared by REI, the City’s hired environmental engineer. The fourth proposal incorporates the CCW’s request for 7 testing locations. The cost estimate for these 7 tests was prepared by City staff based on REI’s unit costs from the previous three proposals. All proposals, including the latest revised proposal and their costs, are outlined as follows:

<b>Initial Phase II Proposal From REI - 20 borings; total of 40 samples</b>			
<b>Description</b>	<b>Qty</b>	<b>Price</b>	<b>Total</b>
Hydraulic Push Borings	1	\$4,235.00	\$4,235.00
Lab Analysis (Dioxin/Furan, Metals, VOC, PAH, PCP)	40	\$1,105.00	\$44,200.00
Lab Analysis (Ground Water)	10	\$1,100.00	\$11,000.00
Field time sample collection, equipment & survey	1	\$5,344.00	\$5,344.00
Summary Report & Analysis	1	\$6,372.00	\$6,372.00
		<b>Total =</b>	<b>\$71,151.00</b>

<b>Revision 1 of Phase II Proposal From REI - 6 borings; total of 12 samples</b>			
<b>Description</b>	<b>Qty</b>	<b>Price</b>	<b>Total</b>
Hydraulic Push Borings	1	\$1,637.00	\$1,637.00
Lab Analysis (Dioxin/Furan, Metals, VOC, PAH, PCP, GW)	12	\$1,105.00	\$13,260.00
Lab Analysis (Ground Water)	6	\$1,100.00	\$6,600.00
Field time sample collection, equipment & survey	1	\$2,631.00	\$2,631.00
Summary Report & Analysis	1	\$5,356.00	\$5,356.00
		<b>Total =</b>	<b>\$29,484.00</b>

<b>Revision 2 of Phase II Proposal From REI - 6 borings; total of 12 samples</b>			
<b>Description</b>	<b>Qty</b>	<b>Price</b>	<b>Total</b>
Hydraulic Push Borings	1	\$1,637.00	\$1,637.00
Lab Analysis (Dioxin/Furan, Metals, VOC, PAH, PCP, GW)	12	\$1,105.00	\$13,260.00
Lab Analysis (Dioxin/Furan)	2	\$1,100.00	\$2,200.00
Lab Analysis (Ground Water)	6	\$1,100.00	\$6,600.00
Field time sample collection, equipment & survey	1	\$2,757.00	\$2,757.00
Summary Report & Analysis	1	\$5,620.00	\$5,620.00
		<b>Total =</b>	<b>\$32,074.00</b>

<b>Revision 3 of Phase II Proposal - 7 borings; total of 7 samples</b>			
<b>Description</b>	<b>Qty</b>	<b>Price</b>	<b>Total</b>
Surface Soil Samples (A-Horizon)	7	\$120.00	\$840.00
Lab Analysis (Dioxin/Furan EPA Method 1613B)	7	\$1,100.00	\$7,700.00
Field time sample collection, equipment & survey	1	\$1,400.00	\$1,400.00
Summary Report & Analysis	1	\$5,400.00	\$5,400.00
		<b>Total =</b>	<b>\$15,340.00</b>

Wauleco completed their WDNR mandated soil testing and the initial results and a brief narrative of the testing are attached for your reference. These results were released to the public on September 27. The WDNR will review these results and Wauleco has up to 60 days to complete a formal report and interpretation of the results. These results have also been shared with the State Toxicologists and they will be reviewing the results in the coming weeks.

## Jamie Polley

---

**From:** Tom Kilian <tkilian@kilianimc.com>  
**Sent:** Friday, September 6, 2019 3:27 PM  
**To:** Patrick Peckham  
**Cc:** Gary Gisselman; Dennis Smith; Tom Neal; Dave Nutting; Jamie Polley  
**Subject:** Soil Sample Locations Requested of Citizens for a Clean Wausau  
**Attachments:** Proposed\_Park\_Sample\_Locations.jpg

Good Afternoon Committee Chair Peckham,

Please find attached a map with soil sample locations that we were asked to provide for future Riverside Park testing. These locations stem from the recommended Testing Zone 3 in our July 2019 presentation: *the depressed elevation zone where runoff and ponding have been suspected.*

While the number of borings in the various REI proposals has varied, Citizens for a Clean Wausau feels that the most critical information can be captured by the 7 soil samples we have identified on the map. These are in the suspected runoff zone which has been of primary concern. As can be noted in the image, samples should be collected from low areas near the toe of the slope. The locations align logically with known elevation data and/or the DNR map outlining storm water pathways in the park. That information can be found in our presentation slides. Certain committee members have communicated fiscal concerns in the recent past about the number of samples to be done and -- taking those sensitivities into consideration -- the attached provides a reasonable, effective, and cost-effective way to begin capturing the most important data required.

If no soil exceedances (based on Wisconsin Soil Cleanup Standards) are identified in upcoming testing, that would be a very positive scenario, indeed. However, if exceedances are identified, a second phase of testing should be done to continue defining the full extent of the contamination. We believe the attached locations are a key aspect in getting this process started, and by doing so with a strong, data-driven rationale.

In addition to the specific sample locations that had been asked of us at the last Parks & Recreation Committee meeting, we are again requesting that the sampling be done in the manner that identified the soil dioxin exceedances near the culvert area in the 2006 testing, as a primary objective of this current testing is to identify exceedances and "hot spots." Particularly with budget concerns from some on the committee, testing of multiple depths is not required or recommended, nor is advanced machinery. We are asking for dioxin/furan testing of the attached soil sample locations that:

- be done with hand tools and the specific depth we are requesting is the base of the A-Horizon (topsoil) -- between 4" to 8" in depth
- uses EPA Method 1613B in the lab analysis for dioxins
- allows a citizen monitor be present during all sampling activity and provides split samples to Citizens for a Clean Wausau

We will continue to communicate with the committee prior to the next meeting regarding other potential contaminants of concern, especially the PCBs with TEFs, due to the related DNR statement which can be found in our presentation.

It would seem that the suggestions in the attached map and this communication align well with historical documentation and available government information, and may also reduce the effort's financial costs with which some committee members are concerned.

Please let us know if you have any questions. Thank you for asking us to provide the exact sample locations for future park testing. We look forward to seeing these locations tested.

Sincerely,

Tom Kilian  
Spokesperson, Citizens for a Clean Wausau





708 Heartland Trail  
Suite 3000  
Madison, WI 53717

608-826-3600 PHONE  
608-826-3941 FAX

[www.TRCsolutions.com](http://www.TRCsolutions.com)

September 24, 2019

Mr. Matt Thompson  
Wisconsin Department of Natural Resources  
1300 W. Clairemont Avenue  
Eau Claire, WI 54701

Subject: Wood Waste Burning Site Investigation Results Transmittal  
Wauleco, Inc., Wausau, Wisconsin  
BRRTS #02-37-000006

Dear Mr. Thompson:

On behalf of Wauleco, Inc. and pursuant to Chp. NR 716.14((2), Wis. Admn. Code, TRC is transmitting the analytical results of soil samples collected to implement the March 15, 2019 Wauleco Wood Burning Site Investigation Work Plan, and addenda 1 and 2 (Work Plans).

Thirty-six (36) surface soil samples were collected and analyzed for dioxins and furans. The 36 surface soil samples, see Figure 1, included:

- 10 samples, labeled as the O-series samples, collected within the area of maximum predicted historic aerial distribution from the Wauleco facility, and areas perpendicular thereto.
- 25 samples, labeled as the N-series samples, collected as background samples. These background samples are located to assess the effects of potential sources of dioxins and furans unrelated to wood burning at the former plant on the Wauleco property. Therefore, these background samples are located outside the area of maximum predicted aerial distribution from wood burning at the former plant on the Wauleco property and are collected near the following potential sources of dioxins and furans:
  - N1 – City Incinerator, the City of Wausau’s former municipal solid waste incinerator
  - N2 – Yard Waste Burning and Residential Burn Barrels
  - N3 – Former Marathon Rubber Facility
  - N4 – Railroad tracks/source
  - N5 – Vehicle Traffic

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– N6 – Urban Conditions

- One sample, labeled as N7-1, was collected at the request of WDNR in the area of 117/120 River Street.

This transmittal is organized to provide the information required by NR 716.14(2), as follows:

- **716.14(2).(a):**

- Preliminary Cause and Significance: The cause of the dioxins and furans in surface soils is assumed to be the ubiquitous nature of dioxins and furans in urban settings.

The significance of the dioxins and furans in surface soils is based on their relationship to the WDNR direct contact residual contaminant levels (RCLs), and the toxic equivalency (TEQ), as used by the Wisconsin Department of Health Services (WDHS).

A comparison of the dioxin and furan concentrations results to non-industrial (i.e., residential) direct contact RCLs reveals the following (see Table 1):

- O-Series Samples: The O-series surface soil samples (i.e., those within the area of maximum predicted historic aerial distribution from wood burning at the former plant on the Wauleco property) were all less than residential direct contact RCLs.
- N-Series Background Samples:
  - N1 – City Incinerator – all five samples were less than residential direct contact RCLs.
  - N2 – Yard Waste Burning and Residential Burn Barrels – one of five samples exceeded a residential direct contact RCL.
  - N3 – Former Marathon Rubber Facility – all four samples were less than residential direct contact RCLs.
  - N4 – Railroad tracks/source – all three samples exceeded a residential direct contact RCL.



- N5 – Vehicle Traffic – one of the four samples exceeded a residential direct contact RCL.
- N6 – Urban Conditions – all four samples were less than residential direct contact RCLs.
- N7-1 – 117/120 River St. The sample was less than residential direct contact RCLs.

The TEQ for dioxins and furans was calculated using the toxic equivalent factors (TEF) published by both the World Health Organization (2005) and the U.S. Environmental Protection Agency (2007). The TEQ values for the 36 surface soils collected for this sampling event are included in Table 1 and Attachment 1. The TEQ values for the background samples (N1 through N7 series samples) ranged from 0.27 ng/kg to 62.5 ng/kg. The TEQ values for the O-series samples ranged from 0.37 ng/kg to 17.45 ng/kg.

The TEQ values for the historical samples collected by others are as follows:

SAMPLE IDENTIFIER	TEQ VALUE (ng/kg)	SAMPLE IDENTIFIER	TEQ VALUE (ng/kg)
Culv. In.	105.65	B-103 – 120 E. Thomas St	2.37
Culv. Out.	87.70	B-104 – 110 E. Thomas St	3.27
122 River St.	11.72	B-1	0.00
1003 Emter	46.10	B-1	0.00
130 River St.	2.75	B-2	3.74
141 River St.	1.34	B-2	0.04
120 River St.	1.88	B-3	2.82
117 River St. 1	43.69	B-3	0.00
117 River St. 2	42.40	B-4	0.01
Fern Island	4.23	B-4	0.00
Oak Island	0.58	B-5	0.00
Weston	0.01	B-5	0.00
B-101 – 140 E. Thomas St.	15.44	B-6	0.00
B-102 – 138 E. Thomas St.	4.25	B-6	0.00

Note: these values were also calculated using the 2005 WHO/2007 EPA TEF values.



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The significance of the dioxin and furan results are that there are no WDNR residential direct contact RCL exceedances for the O-series samples (i.e., those within the area of maximum predicted historic aerial distribution from wood burning at the former plant on the Wauleco property).

- List of Names and Addresses of Those Receiving Notification:
  - Matt Thompson, Wisconsin Department of Natural Resources, 1300 W Clairemont Ave, Eau Claire, WI 54701
  - Eric Lindman, Director of Public Works & Utilities, City of Wausau, 407 Grant Street, Wausau, WI 54403-4783
- Date of Sampling Event and Mailing: The date of sampling was August 13 and 14, 2019, and sample results were received on September 10, 2019.
- **716.14(2)(b):** Additional information in accordance with 714.05(5) may be obtained by contacting Mr. Matt Thompson at (715) 839-3750.
- **716.14(2)(c):**
  1. Responsible party name, address, and phone number:  
Wauleco Inc.  
Attn: Evan Schreiner  
1800 North Point Drive  
Stevens Point, Wisconsin 54481  
(715) 346-8530
  2. Site Name and Property Address: Wauleco Inc., 125 Rosecrans St., Wausau, Wisconsin 54402
  3. Department BRRTS Number: 02-37-000006
  4. Department Contact Person: Mr. Matt Thompson, (715) 839-3750
  5. Reason for Sampling: In response to a request by the WDNR.
  6. Contaminant Type: Dioxin and furans
  7. Sample Type: Surface soils



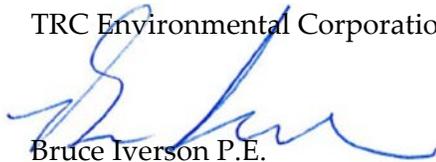
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8. Map Meeting the Requirements of NR 716.15(4): See Figure 1.
9. Collection Date, Specific Contaminant Levels per Location and Whether the Sample Results Attain or Exceed State Standards. See Table 1.
10. Copy of the Results from the Laboratory. See Attachment 1.

If you have any questions or comments regarding this information, please call me at (608) 826-3644.

Sincerely,

TRC Environmental Corporation



Bruce Iverson P.E.  
Project Manager

Enclosures: Table 1: Summary of 36 Surface Soil Sample Dioxin and Furan Results  
Figure 1: Soil Sample Locations  
Attachment 1: Laboratory Analytical Reports

cc: Eric Lindman – City of Wausau  
Evan Schreiner – Wauleco, Inc.  
David Crass – Michael Best & Friedrich, LLP  
Ken Quinn – TRC



Table 1  
Summary of 36 Surface Soil Sample Dioxin and Furan Results

ANALYTE	UNITS	NR 720 SOIL RCLs		SAMPLE AREA/TYPE, SAMPLE ID, DEPTH (inches) <sup>1)</sup> , SAMPLE DATE										
		NON-INDUSTRIAL DIRECT CONTACT	INDUSTRIAL DIRECT CONTACT	CITY INCINERATOR					YARD WASTE BURNING AND BURN BARRELS					MARATHON RUBBER
				N1-1	N1-2	N1-3	N1-4	N1-5	N2-1	N2-2	N2-3	N2-4	N2-5	N3-1
				0-6	0-6	0-6	0-6	0-6	0-6	0-5 <sup>(2)</sup>	0-6	0-6	0-6	0-6
8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019		
<b>DIOXIN CONGENERS</b>														
2,3,7,8-TCDD	ng/Kg	4.82	21.8	< 0.22	0.26 J	< 0.12	< 0.21	< 0.22	< 0.24	< 0.36	16	< 0.32	< 0.37	< 0.13
1,2,3,7,8-PeCDD	ng/Kg	4.93	22.3	0.51 J	1 IJ EMPC	0.23 J	0.24 J	0.62 IJ EMPC	0.82 J	3 J	0.79 J	2.5 J	0.7 J	0.83 J
1,2,3,4,7,8-HxCDD	ng/Kg	49.3	223	0.77 J	1.4 J	0.43 J	0.41 J	1.3 J	0.92 BJ	7.2	1.8 J	3.4 J	1.4 J	1.2 IJ EMPC
1,2,3,6,7,8-HxCDD	ng/Kg	49.3	223	2.2 J	6.6	0.9 J	0.96 J	2.5 J	2 J	22	3.8 J	11	4.2 J	4.4 J
1,2,3,7,8,9-HxCDD	ng/Kg	49.3	223	1.5 J	2.8 J	0.71 J	0.86 J	2.3 J	1.6 J	13	3.3 J	4.1 J	0.91 IJ EMPC	3 J
1,2,3,4,6,7,8-HpCDD	ng/Kg	484	2190	54	180	20	16	71	34	400	72	210	100	58
OCDD	ng/Kg	16400	74400	600	1800	190	120	640	250	3000	520	1600	610	320
Total HpCDD	ng/Kg	-	-	100	340	42	32	140	63	670	130	350	230	120
Total HxCDD	ng/Kg	-	-	19	61	9.2	13	31	20	130	36	71	44	77
Total PeCDD	ng/Kg	-	-	4.4 J	15	1.4 J	5	6.7	7.5	23	9	11	5.1	38
Total TCDD	ng/Kg	-	-	3.9	7.8	0.9 J	2.8	2.3	3.3	3.5	19	2.7	1.2	15
<b>FURAN CONGENERS</b>														
2,3,7,8-TCDF	ng/Kg	48.4	219	< 0.47	1.9 C	0.13 IJ EMPC	0.25 J	< 0.31	0.55 J	0.97 J	0.79 J	1.8 C	0.67 J	0.45 J
1,2,3,7,8-PeCDF	ng/Kg	164	744	0.35 J	0.95 J	0.1 J	< 0.31	< 0.41	0.6 J	2 J	1 J	1.9 J	0.88 J	1.2 J
2,3,4,7,8-PeCDF	ng/Kg	16.4	74.4	0.8 J	12	0.38 J	0.72 J	1.4 IJ EMPC	1.6 IJ EMPC	6.8	5.7	13	1.5 J	2.2 J
1,2,3,4,7,8-HxCDF	ng/Kg	48.5	220	0.85 J	4 J	0.32 J	0.71 IJ EMPC	1.1 J	0.91 IJ EMPC	12	1.9 J	6.1	1.2 IJ EMPC	5.3
1,2,3,6,7,8-HxCDF	ng/Kg	48.5	220	0.94 J	5.5	0.26 J	0.79 J	0.8 IJ EMPC	1.2 J	9.1 P EMPC	3 J	6	1.5 J	4.3 J
2,3,4,6,7,8-HxCDF	ng/Kg	49.3	223	0.77 J	2.6 J	0.34 J	1.3 J	0.58 IJ EMPC	1 J	5.6	3 J	6.1	1.5 J	6.1
1,2,3,7,8,9-HxCDF	ng/Kg	49.3	223	0.31 J	1.5 J	< 0.041	0.32 IJ EMPC	< 0.12	0.49 IJ EMPC	4.8 J	0.83 J	1.9 J	< 0.47	1.9 J
1,2,3,4,6,7,8-HpCDF	ng/Kg	490	2220	8.8	60	6.5	8.1	11	13	160	32	94	20	44
1,2,3,4,7,8,9-HpCDF	ng/Kg	490	2220	0.59 J	2 J	0.33 IJ EMPC	0.66 J	0.56 IJ EMPC	0.54 IJ EMPC	11	1.8 J	3.5 IJ EMPC	0.88 IJ EMPC	3.8 J
OCDF	ng/Kg	16400	74400	27	85	18	17	28	18	310	59	130	34	50
Total HpCDF	ng/Kg	-	-	27	140	14	16	26	27	420	71	210	43	76
Total HxCDF	ng/Kg	-	-	15	110	7.9	10	20	23	230	77	150	26	59
Total PeCDF	ng/Kg	-	-	14	180	6.2	11	24	33	140	110	160	23	36
Total TCDF	ng/Kg	-	-	5.3	58	1.3	4.2	7.2	16	46	39	56	10	15
Calculated TEQ	ng/Kg	-	-	2.32	10.5	0.99	1.3	2.92	2.74	19.3	21.6	14.1	3.72	5.36

**Analyte Abbreviations:**

**DIOXIN CONGENERS:**

- 2,3,7,8-TCDD = 2,3,7,8-Tetrachlorodibenzo-p-dioxin
- 1,2,3,7,8-PeCDD = 1,2,3,7,8-Pentachlorodibenzo-p-dioxin
- 1,2,3,4,7,8-HxCDD = 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
- 1,2,3,6,7,8-HxCDD = 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
- 1,2,3,7,8,9-HxCDD = 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
- 1,2,3,4,6,7,8-HpCDD = 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
- OCDD = Octachlorodibenzo-p-dioxin
- Total HpCDD = Total heptachlorodibenzo-p-dioxin
- Total HxCDD = Total hexachlorodibenzo-p-dioxin
- Total PeCDD = Total pentachlorodibenzo-p-dioxin
- Total TCDD = Total tetrachlorodibenzo-p-dioxin

**FURAN CONGENERS:**

- 2,3,7,8-TCDF = 2,3,7,8-Tetrachlorodibenzofuran
- 1,2,3,7,8-PeCDF = 1,2,3,7,8-Pentachlorodibenzofuran
- 2,3,4,7,8-PeCDF = 2,3,4,7,8-Pentachlorodibenzofuran
- 1,2,3,4,7,8-HxCDF = 1,2,3,4,7,8-Hexachlorodibenzofuran
- 1,2,3,6,7,8-HxCDF = 1,2,3,6,7,8-Hexachlorodibenzofuran
- 2,3,4,6,7,8-HxCDF = 2,3,4,6,7,8-Hexachlorodibenzofuran
- 1,2,3,7,8,9-HxCDF = 1,2,3,7,8,9-Hexachlorodibenzofuran
- 1,2,3,4,6,7,8-HpCDF = 1,2,3,4,6,7,8-Heptachlorodibenzofuran
- 1,2,3,4,7,8,9-HpCDF = 1,2,3,4,7,8,9-Heptachlorodibenzofuran
- OCDF = Octachlorodibenzofuran
- Total HpCDF = Total heptachlorodibenzofuran
- Total HxCDF = Total hexachlorodibenzofuran
- Total PeCDF = Total pentachlorodibenzofuran
- Total TCDF = Total tetrachlorodibenzofuran

**Notes:**

1. ng/kg = nanograms/kilogram on a dry weight basis
2. TEQ = Toxicity Equivalent Calculation
3. TEQ values calculated using the U.S. EPA 2007 values: <https://www.govinfo.gov/content/pkg/FR-2007-05-10/pdf/E7-9015.pdf>
4. - = standard not established/not applicable
5. RCLs = NR 720 Residual Contaminant Levels. Values are generic RCLs for exposure by direct contact.
6. **Blue** = exceedance of Non-Industrial Direct Contact RCL

**Qualifiers:**

- EMPC = Estimated Maximum Possible Concentration
- J = Estimated value
- I = Interference present
- C = Result obtained from confirmation analysis
- B = Less than 10x higher than method blank level
- DN2 = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- P = PCDE Interference

**Footnotes:**

1. Samples were collected to the depth noted in inches below ground surface (bgs), not including the vegetative layer at the surface.
2. Sample N2-2 collected to 5 inches bgs due to refusal from roots.
3. Sample N6-3 collected to 5.5 inches bgs due to refusal from stones.

Prepared by: P. Popp  
Checked by: L. Auner, 9/20/2019

Table 1  
Summary of 36 Surface Soil Sample Dioxin and Furan Results

ANALYTE	UNITS	NR 720 SOIL RCLs		SAMPLE AREA/TYPE, SAMPLE ID, DEPTH (inches) <sup>1)</sup> , SAMPLE DATE											
				MARATHON RUBBER (CONT.)			RAILROAD			VEHICLE TRAFFIC			URBAN CONDITIONS		
		NON-INDUSTRIAL DIRECT CONTACT	INDUSTRIAL DIRECT CONTACT	N3-2	N3-3	N3-4	N4-1	N4-2	N4-3	N5-1A	N5-2A	N5-3	N5-4	N6-1	N6-2
				0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6
		8/13/2019	8/13/2019	8/13/2019	8/14/2019	8/14/2019	8/14/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	
<b>DIOXIN CONGENERS</b>															
2,3,7,8-TCDD	ng/Kg	4.82	21.8	< 0.13	< 0.098	< 0.14	0.8 J	0.85 J	1	< 0.52	< 0.5	< 0.97	< 0.42	< 0.54	< 0.77
1,2,3,7,8-PeCDD	ng/Kg	4.93	22.3	0.46 J	0.16 J	< 0.26	2.5 J	5.2	5.9	0.46 IJ EMPC	0.94 J	2.4 J	2.2 J	0.6 J	1.2 J
1,2,3,4,7,8-HxCDD	ng/Kg	49.3	223	0.85 J	0.19 J	< 0.29	6.3	7.8 JDN2	9 JDN2	0.77 BJDN2	1.9 J	2.5 JDN2	3.6 J	0.77 BJDN2	1.7 JDN2
1,2,3,6,7,8-HxCDD	ng/Kg	49.3	223	2.9 J	0.73 J	0.44 IJ EMPC	24	39 DN2	44 DN2	1.7 IJDN2 EMPC	3.6 IJ EMPC	5.1 JDN2	38	1.5 JDN2	5.1 JDN2
1,2,3,7,8,9-HxCDD	ng/Kg	49.3	223	1.6 IJ EMPC	0.4 J	< 0.32	12	15 JDN2	15 JDN2	1.3 IJDN2 EMPC	3 J	5 JDN2	5.1	1.3 IJDN2 EMPC	1.9 JDN2
1,2,3,4,6,7,8-HpCDD	ng/Kg	484	2190	39	14	11	530	820 DN2	930 DN2	37 DN2	76	100 DN2	580	19 JDN2	96 DN2
OCDD	ng/Kg	16400	74400	220	110	90	5100	7300 DN2	9200 DN2	340 DN2	660	1200 DN2	4200 E	160 DN2	860 DN2
Total HpCDD	ng/Kg	-	-	79	28	21	1000	1600 DN2	1900 DN2	81 DN2	140	230 DN2	960	39 DN2	200 DN2
Total HxCDD	ng/Kg	-	-	47	6.1	3 J	170	260 DN2	310 DN2	8.3 JDN2	31	35 DN2	140	6.8 JDN2	39 DN2
Total PeCDD	ng/Kg	-	-	21	0.96 J	0.5 J	22	25	33	< 0.3	6.3	10	11	1.3 J	3.9 J
Total TCDD	ng/Kg	-	-	8.7	0.36 J	0.55 J	11	18	12	1.2	0.67 J	< 0.97	0.61 J	< 0.54	1.7
<b>FURAN CONGENERS</b>															
2,3,7,8-TCDF	ng/Kg	48.4	219	0.3 IJ EMPC	0.15 J	< 0.15	2.1 0	4.4 C	2.4 0	< 0.54	< 0.76	< 0.99	0.3 J	< 0.35	< 0.68
1,2,3,7,8-PeCDF	ng/Kg	164	744	0.77 J	0.14 J	< 0.14	2.1 J	270 P EMPC	3.4 J	< 0.46	1.2 IJ EMPC	< 0.48	1.2 J	< 0.45	< 0.53
2,3,4,7,8-PeCDF	ng/Kg	16.4	74.4	1.2 J	0.35 J	< 0.12	11	14	61	1.6 J	1.8 J	1.1 J	2.7 J	0.8 J	5
1,2,3,4,7,8-HxCDF	ng/Kg	48.5	220	3.2 J	0.29 J	0.22 J	8.2	16 JDN2	75 PDN2 EMPC	1.1 JDN2	2.8 J	2 JDN2	3.5 J	0.57 JDN2	2.8 JDN2
1,2,3,6,7,8-HxCDF	ng/Kg	48.5	220	2.4 J	0.33 IJ EMPC	0.21 IJ EMPC	8	20 JDN2	28 PDN2 EMPC	1.1 JDN2	1.7 IJ EMPC	1.2 JDN2	2.4 J	0.79 JDN2	2.2 JDN2
2,3,4,6,7,8-HxCDF	ng/Kg	49.3	223	3.6 J	0.23 IJ EMPC	0.22 J	6.5	16 JDN2	30 DN2	0.62 JDN2	0.98 IJ EMPC	0.78 IJDN2 EMPC	3.3 J	0.31 IJDN2 EMPC	2.5 JDN2
1,2,3,7,8,9-HxCDF	ng/Kg	49.3	223	0.98 IJ EMPC	< 0.075	< 0.15	3 J	6.7 JDN2	6.1 JDN2	0.43 JDN2	0.72 IJ EMPC	< 0.22 DN2	2.5 J	0.41 JDN2	0.57 IJDN2 EMPC
1,2,3,4,6,7,8-HpCDF	ng/Kg	490	2220	26	6.1	2.7 J	150	250 DN2	380 DN2	11 JDN2	27	23 JDN2	55	7 JDN2	34 DN2
1,2,3,4,7,8,9-HpCDF	ng/Kg	490	2220	2.4 J	0.29 J	< 0.36	9.4	14 JDN2	20 JDN2	0.8 IJDN2 EMPC	1.5 IJ EMPC	1.2 IJDN2 EMPC	2.8 J	< 0.35 DN2	1.5 JDN2
OCDF	ng/Kg	16400	74400	34	9.6 J	6.6 J	320	490 DN2	620 DN2	25 JDN2	65	47 JDN2	230	11 JDN2	73 DN2
Total HpCDF	ng/Kg	-	-	47	13	7	380	610 DN2	1100 DN2	11 JDN2	68	58 DN2	170	15 JDN2	90 DN2
Total HxCDF	ng/Kg	-	-	34	6.4	1.9 J	200	430 DN2	1200 DN2	23 JDN2	49	35 DN2	110	13 JDN2	69 DN2
Total PeCDF	ng/Kg	-	-	23	6.4	1.5 J	180	480	760	21	24	12	31	9.8	58
Total TCDF	ng/Kg	-	-	11	3.1	0.61 J	58	99	140 E	2.7	3.9	1.4	7	1.9	19
Calculated TEQ	ng/Kg	-	-	3.18	0.74	0.27	22.2	44.0	62.5	2.24	4.25	6.1	16.6	1.72	5.97

Analyte Abbreviations:

DIOXIN CONGENERS:

- 2,3,7,8-TCDD = 2,3,7,8-Tetrachlorodibenzo-p-dioxin
- 1,2,3,7,8-PeCDD = 1,2,3,7,8-Pentachlorodibenzo-p-dioxin
- 1,2,3,4,7,8-HxCDD = 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
- 1,2,3,6,7,8-HxCDD = 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
- 1,2,3,7,8,9-HxCDD = 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
- 1,2,3,4,6,7,8-HpCDD = 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
- OCDD = Octachlorodibenzo-p-dioxin
- Total HpCDD = Total heptachlorodibenzo-p-dioxin
- Total HxCDD = Total hexachlorodibenzo-p-dioxin
- Total PeCDD = Total pentachlorodibenzo-p-dioxin
- Total TCDD = Total tetrachlorodibenzo-p-dioxin

FURAN CONGENERS:

- 2,3,7,8-TCDF = 2,3,7,8-Tetrachlorodibenzofuran
- 1,2,3,7,8-PeCDF = 1,2,3,7,8-Pentachlorodibenzofuran
- 2,3,4,7,8-PeCDF = 2,3,4,7,8-Pentachlorodibenzofuran
- 1,2,3,4,7,8-HxCDF = 1,2,3,4,7,8-Hexachlorodibenzofuran
- 1,2,3,6,7,8-HxCDF = 1,2,3,6,7,8-Hexachlorodibenzofuran
- 2,3,4,6,7,8-HxCDF = 2,3,4,6,7,8-Hexachlorodibenzofuran
- 1,2,3,7,8,9-HxCDF = 1,2,3,7,8,9-Hexachlorodibenzofuran
- 1,2,3,4,6,7,8-HpCDF = 1,2,3,4,6,7,8-Heptachlorodibenzofuran
- 1,2,3,4,7,8,9-HpCDF = 1,2,3,4,7,8,9-Heptachlorodibenzofuran
- OCDF = Octachlorodibenzofuran
- Total HpCDF = Total heptachlorodibenzofuran
- Total HxCDF = Total hexachlorodibenzofuran
- Total PeCDF = Total pentachlorodibenzofuran
- Total TCDF = Total tetrachlorodibenzofuran

Notes:

1. ng/kg = nanograms/kilogram on a dry weight basis
2. TEQ = Toxicity Equivalent Calculation
3. TEQ values calculated using the U.S. EPA 2007 values: <https://www.govinfo.gov/content/pkg/FR-2007-05-10/pdf/E7-9015.pdf>
4. - = standard not established/not applicable
5. RCLs = NR 720 Residual Contaminant Levels. Values are generic RCLs for exposure by direct contact.
6. Blue = exceedance of Non-Industrial Direct Contact RCL

Qualifiers:

- EMPC = Estimated Maximum Possible Concentration
- J = Estimated value
- I = Interference present
- C = Result obtained from confirmation analysis
- B = Less than 10x higher than method blank level
- DN2 = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- P = PCDE Interference

Footnotes:

1. Samples were collected to the depth noted below ground surface (bgs), not including the vegetative layer at the surface.
2. Sample N2-2 collected to 5 inches bgs due to refusal from roots.
3. Sample N6-3 collected to 5.5 inches bgs due to refusal from stones.

Prepared by: P. Popp  
Checked by: L. Auner, 9/20/2019

Table 1  
Summary of 36 Surface Soil Sample Dioxin and Furan Results

ANALYTE	UNITS	NR 720 SOIL RCLs		SAMPLE AREA/TYPE, SAMPLE ID, DEPTH (inches) <sup>1)</sup> , SAMPLE DATE												
		NON-INDUSTRIAL DIRECT CONTACT	INDUSTRIAL DIRECT CONTACT	URBAN CONDITIONS (CONT.)			WDNR REQUEST			DATA GAP SAMPLES						
				N6-3	N6-4	N7-1	O-01	O-02	O-03	O-04	O-05	O-06	O-07	O-08	O-09	O-10
				0-5.5 <sup>(3)</sup>	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6
		8/13/2019	8/13/2019	8/14/2019	8/13/2019	8/14/2019	8/14/2019	8/13/2019	8/13/2019	8/14/2019	8/14/2019	8/14/2019	8/14/2019	8/13/2019	8/13/2019	
<b>DIOXIN CONGENERS</b>																
2,3,7,8-TCDD	ng/Kg	4.82	21.8	< 0.39	< 0.44	0.26 J	< 0.18	< 0.19	< 0.22	< 0.21	< 0.26	< 0.22	< 0.14	< 0.2	0.24 J	< 0.27
1,2,3,7,8-PeCDD	ng/Kg	4.93	22.3	0.51 J	0.47 IJ EMPC	0.91 J	0.27 IJ EMPC	< 0.26	0.38 J	0.34 IJ EMPC	1.1 J	0.38 IJ EMPC	< 0.16	0.5 J	2.3 J	0.61 J
1,2,3,4,7,8-HxCDD	ng/Kg	49.3	223	0.8 BJ	0.73 BJDN2	2.2 J	< 0.38	0.45 J	0.49 IJ EMPC	2 J	1.9 J	0.95 J	< 0.31	0.78 IJ EMPC	5.6	1.1 IJ EMPC
1,2,3,6,7,8-HxCDD	ng/Kg	49.3	223	2 IJ EMPC	2.4 JDN2	6.1	0.67 J	1.2 J	1.7 J	3 J	7.7	3.7 J	0.65 J	1.3 IJ EMPC	14	3 J
1,2,3,7,8,9-HxCDD	ng/Kg	49.3	223	1.6 IJ EMPC	1.6 JDN2	3.4 J	0.68 IJ EMPC	1.2 J	1.1 J	2.4 J	4.7 J	2.3 J	< 0.36	1.4 J	10	1.9 J
1,2,3,4,6,7,8-HpCDD	ng/Kg	484	2190	51	39 DN2	150	13	22	33	99	180	83	14	32	330	70
OCDD	ng/Kg	16400	74400	460	310 DN2	1300	110	160	260	580	1400	680	100	270	4000	570
Total HpCDD	ng/Kg	-	-	91	78 DN2	330	30	50	79	410	400	160	25	75	710	140
Total HxCDD	ng/Kg	-	-	14	21 JDN2	56	5.2	12	24	74	92	29	2.5 J	14	140	26
Total PeCDD	ng/Kg	-	-	2.1 J	2.6 J	7.6	0.27 J	0.69 J	6.6	5.3	11	3 J	< 0.16	1.8 J	14	4.4 J
Total TCDD	ng/Kg	-	-	0.73 J	3.1	2.3	0.79 J	< 0.19	3.2	0.63 J	1.7	0.82 J	0.36 J	0.81 J	4.4	2.9
<b>FURAN CONGENERS</b>																
2,3,7,8-TCDF	ng/Kg	48.4	219	< 0.53	0.56 J	0.55 IJ EMPC	< 0.26	< 0.27	< 0.32	< 0.38	0.5 J	< 0.5	< 0.28	< 0.31	1.6 C	0.8 J
1,2,3,7,8-PeCDF	ng/Kg	164	744	< 0.6	0.65 J	0.69 J	< 0.28	< 0.35	< 0.72	< 0.46	< 0.87	< 0.77	< 0.38	< 0.42	1.8 J	0.92 J
2,3,4,7,8-PeCDF	ng/Kg	16.4	74.4	0.46 IJ EMPC	1.9 J	4.1 J	0.39 J	0.89 J	2.9 J	0.78 J	1.7 J	1 J	< 0.19	0.42 IJ EMPC	12	1.7 J
1,2,3,4,7,8-HxCDF	ng/Kg	48.5	220	0.71 IJ EMPC	1.4 JDN2	3.6 PJ EMPC	0.53 J	0.97 J	1 IJ EMPC	1.1 J	2.8 J	2.3 J	0.35 J	0.63 IJ EMPC	7.3	2.1 J
1,2,3,6,7,8-HxCDF	ng/Kg	48.5	220	0.82 IJ EMPC	2 JDN2	2.7 J	0.5 J	0.89 IJ EMPC	0.7 J	1.2 J	2.5 J	2.3 PJ EMPC	0.31 IJ EMPC	0.97 PJ EMPC	5	2 J
2,3,4,6,7,8-HxCDF	ng/Kg	49.3	223	0.53 IJ EMPC	1.7 JDN2	2.4 J	0.61 J	1.5 J	2.7 J	1.1 IJ EMPC	3 J	1.9 IJ EMPC	0.28 IJ EMPC	0.62 J	7	1.2 J
1,2,3,7,8,9-HxCDF	ng/Kg	49.3	223	< 0.38	0.69 JDN2	0.8 J	0.28 J	< 0.23	< 0.15	< 0.28	< 0.45	< 0.4	< 0.31	< 0.14	1.8 J	0.43 J
1,2,3,4,6,7,8-HpCDF	ng/Kg	490	2220	12	17 JDN2	46	4.6 J	9.6	15	19	43	37	4.2 J	10	140	25
1,2,3,4,7,8,9-HpCDF	ng/Kg	490	2220	0.81 IJ EMPC	0.98 IJDN2 EMPC	2.3 J	0.47 J	0.48 IJ EMPC	0.56 IJ EMPC	0.96 J	2.2 J	1.7 IJ EMPC	< 0.22	0.67 J	6.4	1.4 J
OCDF	ng/Kg	16400	74400	43	40 JDN2	71	13	17	25	57	95	58	8.4 J	22	220	45
Total HpCDF	ng/Kg	-	-	33	43 DN2	100	11	19	31	53	92	80	9.6	27	250	56
Total HxCDF	ng/Kg	-	-	15	43 DN2	87	6.5	12	27	21	66	40	2.2 J	14	250	37
Total PeCDF	ng/Kg	-	-	7.3	51	50	3.8 J	20	72	19	46	27	2.1 J	9.2	310	37
Total TCDF	ng/Kg	-	-	2.5	26	21	1.2	2.9	16	3	11	6.3	0.61 J	1.7	53	13
Calculated TEQ	ng/Kg	-	-	2.08	2.84	6.99	0.93	1.26	2.59	3.03	6.62	3.46	0.37	1.71	17.45	3.55

Analyte Abbreviations:

DIOXIN CONGENERS:

- 2,3,7,8-TCDD = 2,3,7,8-Tetrachlorodibenzo-p-dioxin
- 1,2,3,7,8-PeCDD = 1,2,3,7,8-Pentachlorodibenzo-p-dioxin
- 1,2,3,4,7,8-HxCDD = 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
- 1,2,3,6,7,8-HxCDD = 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
- 1,2,3,7,8,9-HxCDD = 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
- 1,2,3,4,6,7,8-HpCDD = 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
- OCDD = Octachlorodibenzo-p-dioxin
- Total HpCDD = Total heptachlorodibenzo-p-dioxin
- Total HxCDD = Total hexachlorodibenzo-p-dioxin
- Total PeCDD = Total pentachlorodibenzo-p-dioxin
- Total TCDD = Total tetrachlorodibenzo-p-dioxin

FURAN CONGENERS:

- 2,3,7,8-TCDF = 2,3,7,8-Tetrachlorodibenzofuran
- 1,2,3,7,8-PeCDF = 1,2,3,7,8-Pentachlorodibenzofuran
- 2,3,4,7,8-PeCDF = 2,3,4,7,8-Pentachlorodibenzofuran
- 1,2,3,4,7,8-HxCDF = 1,2,3,4,7,8-Hexachlorodibenzofuran
- 1,2,3,6,7,8-HxCDF = 1,2,3,6,7,8-Hexachlorodibenzofuran
- 2,3,4,6,7,8-HxCDF = 2,3,4,6,7,8-Hexachlorodibenzofuran
- 1,2,3,7,8,9-HxCDF = 1,2,3,7,8,9-Hexachlorodibenzofuran
- 1,2,3,4,6,7,8-HpCDF = 1,2,3,4,6,7,8-Heptachlorodibenzofuran
- 1,2,3,4,7,8,9-HpCDF = 1,2,3,4,7,8,9-Heptachlorodibenzofuran
- OCDF = Octachlorodibenzofuran
- Total HpCDF = Total heptachlorodibenzofuran
- Total HxCDF = Total hexachlorodibenzofuran
- Total PeCDF = Total pentachlorodibenzofuran
- Total TCDF = Total tetrachlorodibenzofuran

Notes:

1. ng/kg = nanograms/kilogram on a dry weight basis
2. TEQ = Toxicity Equivalent Calculation
3. TEQ values calculated using the U.S. EPA 2007 values: <https://www.govinfo.gov/content/pkg/FR-2007-05-10/pdf/E7-9015.pdf>
4. - = standard not established/not applicable
5. RCLs = NR 720 Residual Contaminant Levels. Values are generic RCLs for exposure by direct contact.
6. Blue = exceedance of Non-Industrial Direct Contact RCL

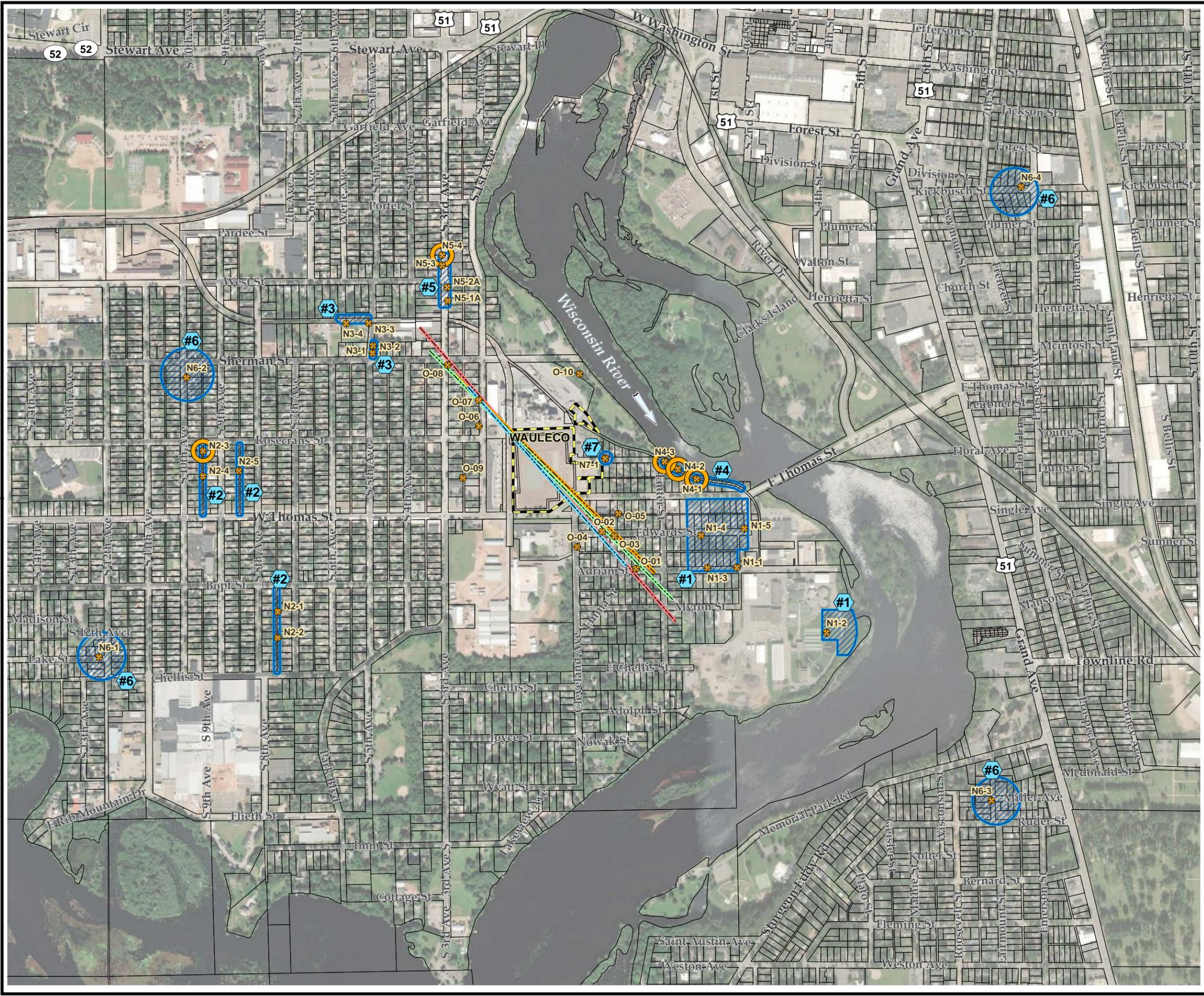
Qualifiers:

- EMPC = Estimated Maximum Possible Concentration
- J = Estimated value
- I = Interference present
- C = Result obtained from confirmation analysis
- B = Less than 10x higher than method blank level
- DN2 = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- P = PCDE Interference

Footnotes:

1. Samples were collected to the depth noted below ground surface (bgs), not including the vegetative layer at the surface.
2. Sample N2-2 collected to 5 inches bgs due to refusal from roots.
3. Sample N6-3 collected to 5.5 inches bgs due to refusal from stones.

Prepared by: P. Popp  
Checked by: L. Auner, 9/20/2019

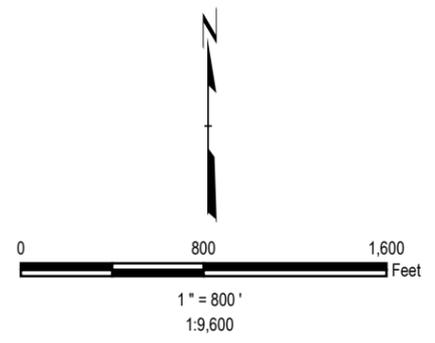


**LEGEND**

- APPROXIMATE WAULECO PROPERTY BOUNDARY
- FORMER HISTORICAL BUILDING FOOTPRINT
- PRIMARY AXES**
- SCENARIO #1
- SCENARIO #2
- SCENARIO #3
- SCENARIO #4
- APPROXIMATE BACKGROUND SAMPLING AREAS
- #1 - City Incinerator
- #2 - Yard Waste Burning and Burn Barrels
- #3 - Marathon Rubber
- #4 - Railroad
- #5 - Vehicle Traffic
- #6 - Urban Conditions
- #7 - WDNR Request Sample
- SURFACE SOIL SAMPLE LOCATION
- SAMPLE WITH NON-INDUSTRIAL DIRECT CONTACT RCL EXCEEDANCE

**NOTES**

1. BASE MAP IMAGERY FROM ESRI, "WORLD IMAGERY", WEB BASEMAP SERVICE LAYER, 2018.
2. THE AXES SHOWN ON THIS MAP ARE THE PRIMARY AXES OF POTENTIAL MAXIMUM AERIAL DEPOSITION BASED ON AIR MODELING DESCRIBED IN THE MAY 16, 2019 SITE INVESTIGATION WORK PLAN ADDENDUM 2.



PROJECT: **WAULECO, INC.  
125 ROSENCRANS STREET  
WAUSAU, WISCONSIN**

TITLE: **SOIL SAMPLE LOCATIONS**

DRAWN BY: J. PAPEZ    PROJ NO.: 189597.0003-T1

CHECKED BY: K. QUINN

APPROVED BY: B. IVERSON

DATE: SEPTEMBER 2019

**FIGURE 1**

**TRC**

708 Heartland Trail, Suite 3000  
Madison, WI 53717  
Phone: 608.626.3600  
www.trcsolutions.com

FILE NO.: 189597-021.mxd

**Attachment 1**  
**Laboratory Analytical Reports**

**Report Prepared for:**

Bruce Iverson  
TRC-WI  
708 Heartland Trail  
Suite 3000  
Madison WI 53717

**REPORT OF  
LABORATORY  
ANALYSIS FOR  
PCDD/PCDF**

**Report Information:**

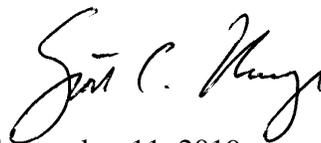
**Pace Project #: 10487441**  
**Sample Receipt Date: 08/15/2019**  
**Client Project #: 189597.0008 Phase 3**  
**Client Sub PO #: 140882**  
**State Cert #: 999407970**

**Invoicing & Reporting Options:**

The report provided has been invoiced as a Level 2 PCDD/PCDF Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Carolynne Trout, your Pace Project Manager.

**This report has been reviewed by:**



September 11, 2019

Scott Unze, Project Manager  
(612) 607-6383  
(612) 607-6444 (fax)  
scott.unze@pacelabs.com



**Report of Laboratory Analysis**

This report should not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc.

The results relate only to the samples included in this report.

**Report Prepared Date:**

September 11, 2019



## **DISCUSSION**

This report presents the results from the analyses performed on thirty-six samples submitted by a representative of TRC. The samples were analyzed for the presence or absence of polychlorodibenzo-p-dioxins (PCDDs) and polychlorodibenzofurans (PCDFs) using USEPA Method 1613B. The reporting limits were based on signal-to-noise measurements. Estimated Maximum Possible Concentration (EMPC) values were treated as positives in the toxic equivalence calculations. Method blank and field sample results presented with reporting limits corresponding to the lowest calibration points and a nominal 10-gram sample amount were included at the end of Appendix A. The quantitation limits, adjusted for sample extraction amount, may be somewhat higher or lower than the reporting limits provided in Appendix A. This report was revised to provide WHO 2005 TEQ results.

The recoveries of the isotopically-labeled PCDD/PCDF internal standards in the sample extracts ranged from 28-137%. All of the labeled standard recoveries obtained for this project were within the target ranges specified in Method 1613B. Also, since the quantification of the native 2,3,7,8-substituted congeners was based on isotope dilution, the data were automatically corrected for recovery and accurate values were obtained.

Values were flagged "I" where incorrect isotope ratios were obtained or "P" where polychlorinated diphenyl ethers were present. Concentrations below the calibration range were flagged "J" and should be regarded as estimates. Concentrations above the calibration range were flagged "E" and should also be regarded as estimates. Values obtained from analyses of diluted extracts were flagged "D" and "N2". The values reported for 2,3,7,8-TCDF were obtained from (flagged "C") or verified by (flagged "V") second column confirmation analyses.

A laboratory method blank was prepared and analyzed with each sample batch as part of our routine quality control procedures. The results show the blanks to contain trace levels of selected congeners. These levels were below the calibration range of the method. Sample levels similar to the corresponding blank levels were flagged "B" on the results tables and may be, at least, partially, attributed to the background. It should be noted that levels less than ten times the background are not generally considered to be statistically different from the background.

Laboratory and matrix spike samples were also prepared using clean reference matrix that had been fortified with native standard materials. The results show that the spiked native compounds were recovered at 76-120% with relative percent differences of 0.0-12.0%. The background-subtracted recovery value obtained for OCDD in the primary matrix spike sample was below the target range, possibly due to sample inhomogeneity. Matrix spikes were prepared with the 08/27/2019 extraction batch using sample material from a separate project; results from these analyses will be provided upon request. Matrix spikes were not prepared with the remaining extraction batch.

## **REPORT OF LABORATORY ANALYSIS**

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## Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Minnesota - Pet	1240
Alabama	40770	Mississippi	MN00064
Alaska - DW	MN00064	Missouri - DW	10100
Alaska - UST	17-009	Montana	CERT0092
Arizona	AZ0014	Nebraska	NE-OS-18-06
Arkansas - DW	MN00064	Nevada	MN00064
Arkansas - WW	88-0680	New Hampshire	2081
CNMI Saipan	MP0003	New Jersey (NE)	MN002
California	2929	New York	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Carolina -	27700
EPA Region 8+	via MN 027-053	North Carolina -	530
Florida (NELAP)	E87605	North Dakota	R-036
Georgia	959	Ohio - DW	41244
Guam	17-001r	Ohio - VAP	CL101
Hawaii	MN00064	Oklahoma	9507
Idaho	MN00064	Oregon - Primar	MN300001
Illinois	200011	Oregon - Secon	MN200001
Indiana	C-MN-01	Pennsylvania	68-00563
Iowa	368	Puerto Rico	MN00064
Kansas	E-10167	South Carolina	74003
Kentucky - DW	90062	South Dakota	NA
Kentucky - WW	90062	Tennessee	TN02818
Louisiana - DE	03086	Texas	T104704192
Louisiana - DW	MN00064	Utah (NELAP)	MN00064
Maine	MN00064	Virginia	460163
Maryland	322	Washington	C486
Massachusetts	M-MN064	West Virginia -	382
Michigan	9909	West Virginia -	9952C
Minnesota	027-053-137	Wisconsin	999407970
Minnesota - De	via MN 027-053	Wyoming - UST	2926.01

## REPORT OF LABORATORY ANALYSIS

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Report No.....10487441

# Appendix A

## Sample Management



**CHAIN-OF-CUSTODY / Analytical Request Document**  
The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

**Section A**  
Required Client Information:  
Company: **TRC**  
Address: **708 Hewland Trl. A Suite 3000 Madison, WI 53717**  
Email: **biverson@trccompanies.com**  
Phone: **608-826-3644**  
Requested Due Date/TAT: **Standard 7-10**

**Section B**  
Required Project Information:  
Report To: **biverson@trccompanies.com**  
Copy To: **kquinn@trccompanies.com**  
**denright@trccompanies.com**  
Purchase Order No.: **140882**  
Project Name: **Dioxin Sampling**  
Project Number: **189577008 Phase 3**

**Section C**  
Invoice Information:  
Attention: **apmvoiceapproval@trccompanies.com**  
Company Name: **TRC**  
Address: \_\_\_\_\_  
Site Location: **WI**  
State: **WI**

Page: **1** of **3**  
2296847

REGULATORY AGENCY: \_\_\_\_\_  
 NPDES  GROUND WATER  DRINKING WATER  
 UST  RCRA  OTHER

Site Location: \_\_\_\_\_  
 STATE: **WI**

**Section D**  
Requested Client Information:  
Matrix Codes: DW, WT, WW, P, SL, OL, WP, AR, AS, OT  
 Drinking Water, Waste Water, Product, Soil/Solid, Oil, Wine, Air, Tissue, Other

**Section E**  
Requested Analysis Filtered (Y/N)

**Section F**  
Preservatives: HCl, HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, Unpresrvd, NaOH, Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, Methanol, Other

**Section G**  
COLLECTED: COMPOSITE START, COMPOSITE END/GRAB

**Section H**  
RELINQUISHED BY / AFFILIATION: DATE, TIME

**Section I**  
ACCEPTED BY / AFFILIATION: DATE, TIME

**Section J**  
SAMPLE CONDITIONS

**Section K**  
Temp in °C, Received on, Sealed Cooler, Samples Intact

**Section L**  
DATE SIGNED (MM/DD/YYYY)

**Section M**  
SAMPLER NAME AND SIGNATURE, PRINT Name of SAMPLER, SIGNATURE of SAMPLER

**Section N**  
SAMPLE ID (A-Z, 0-9 / -)  
Sample IDs MUST BE UNIQUE

**Section O**  
ADDITIONAL COMMENTS

**Section P**  
Pace Project No./ Lab I.D.

**Section Q**  
Barcode: **10487441**

ITEM #	MATRIX CODE	SAMPLE TYPE (G-RAB C-COMP)	DATE	TIME	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp in °C	Received on	Sealed Cooler	Samples Intact
1	N6-1	SLG	8/13/19	8:00	Alia Emergent / TRC	8/13/19	11:35	Wanlee cooler	8/13/19	11:35				
2	N6-2		8/16	8:40	Wanlee cooler / TRC	8/14/19	15:30	Pace shipment cooler	8/14/19	15:30				
3	N6-4		9:00	9:35	S. J. Dumb	8/14/19	15:30	Wanlee cooler	8/15/19	8:40	36°	Y	Y	Y
4	N6-3		9:45	10:05										
5	N2-1		10:15	10:30										
6	N2-2		10:55	11:15										
7	N2-4		11:25											
8	N2-3													
9	N2-5													
10	N5-2A													
11	N5-1A													
12	N5-3													

\*Important Note: By signing this form you are accepting Pace's NET 30-day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.



# CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

**Section A**  
 Required Client Information:  
 Company: **TRC**  
 Address: **168 Heartland Trail, #300 Madison, WI 53717**  
 Email To: **lisa@trccompanies.com**  
 Phone: **608-826-3644**  
 Requested Date/Time: **Standard 7-10**

**Section B**  
 Required Project Information:  
 Report To: **bverser@trccompanies.com**  
 Copy To: **kquinn@trccompanies.com**  
 Address: **oeriyat@trccompanies.com**  
 Purchase Order No.: **140882**  
 Project Name: **Piscina Sampling**  
 Project Number: **199597.0008 Phase 3**

**Section C**  
 Invoice Information:  
 Attention: **ad@trccompanies.com**  
 Company Name: **TRC**  
 Address: **REGULATORY AGENCY**  
 NPDES  GROUND WATER  DRINKING WATER   
 UST  RCRA  OTHER   
 Site Location: **WT**  
 STATE: **WI**

Page: **2** of **3**  
 2296848

ITEM #	SAMPLE ID (A-Z, 0-9 / -)	Matrix Codes MATRIX CODE Drinking Water DW Waste Water WT Waste Water Product WW Soil/Solid P Oil OIL Wipe WIP Air AR Tissue TS Other OT	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	# OF CONTAINERS	PRESERVATIVES		Analysis Test Y/N	Requested Analysis Filtered (Y/N)	Temp in °C	Received on	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
			COMPOSITE START	COMPOSITE END/GRAB				DATE	TIME						
1	N5-4				SL G		1			X					
2	N3-4			8/13/19			1			X					
3	N3-3			11:35			1			X					
4	N3-2			12:50			1			X					
5	N3-1			13:00			1			X					
6	N1-2			13:10			1			X					
7	N1-3			13:20			1			X					
8	N1-1			13:40			1			X					
9	N1-5			14:25			1			X					
10	N1-4			14:40			1			X					
11	0-10			14:45			1			X					
12	0-69			15:00			1			X					
				15:26			1			X					
				15:45			1			X					
ADDITIONAL COMMENTS: <b>* see comment on p. 1</b> <b>Alia Enright/TRC</b> <b>Wanda Coaker</b> <b>SJ. Dumb</b>															
RELINQUISHED BY / AFFILIATION: <b>Alia Enright/TRC</b> <b>Wanda Coaker</b> <b>SJ. Dumb</b>															
ACCEPTED BY / AFFILIATION: <b>Wanda Coaker</b> <b>Pete Shifment-coaker</b> <b>Alia Enright</b>															
DATE: <b>8/13/19 14:00</b> <b>8/14/19 15:30</b> <b>8/14/19 15:30</b>															
SAMPLE CONDITIONS: <b>8/15/19 14:00</b> <b>8/14/19 15:30</b> <b>8/14/19 15:30</b>															
Pace Project No./ Lab I.D.: <b>216 091 013</b> <b>217 012 014</b> <b>015</b> <b>016</b> <b>017</b> <b>018</b> <b>019</b> <b>020</b> <b>021</b> <b>022</b> <b>023</b> <b>024</b>															

SAMPLER NAME AND SIGNATURE:  
 PRINT Name of SAMPLER:  
 SIGNATURE OF SAMPLER:  
 DATE SIGNED (MM/DD/YYYY):

ORIGINAL

\*Important Note: By signing this form, you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.



# CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

**Section A**  
Required Client Information:

Company: **TRC**

Address: **708 Heartland Trail, #200  
Madison, WI 53717**

Email To: **biverson@trccompanies.com**

Phone: **608-816-3444**

Requested Due Date/TAT: **standard 7-10**

**Section B**  
Required Project Information:

Report To: **biverson@trccompanies.com**

Copy To: **quinn@trccompanies.com**

Project Name: **Dioxin Sampling**

Project Number: **18997.0008 Phase 3**

**Section C**  
Invoice Information:

Company Name: **TRC**

Address: **2296849**

REGULATORY AGENCY

Site Location: **WI**

STATE: **WI**

**Section D**  
Required Client Information

Matrix Codes: DW, WT, WW, P, SL, OL, WP, AR, TS, OT

Matrix / CODE: Drinking Water, Waste Water, Product, Soil/Solid, Oil, Wipe, Air, Tissue, Other

**SAMPLE ID**  
(A-Z, 0-9 / -)

Sample IDs MUST BE UNIQUE

ITEM #	MATRIX CODE	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	REQUISITIONED BY / AFFILIATION		REQUISITIONED BY / AFFILIATION		# OF CONTAINERS	Preservatives	Analysis Test ↑	Temp in °C	Received on Ice (Y/N)	Sealed Cooler (Y/N)	Samples Intact (Y/N)
		COMPOSITE START	COMPOSITE END/GRAB			DATE	TIME	DATE	TIME							
1	0-01			G	SL G	8/13/19	16:00	8/13/19	16:40	1	Unpreserved	X	8/14/19	9:45		
2	0-04			G	1	8/13/19	16:15	8/13/19	16:40	1	Unpreserved	X	8/14/19	15:30		
3	0-05			G	1	8/14/19	16:25	8/14/19	15:30	1	Unpreserved	X	8/14/19	15:30		
4	0-06			G	1	8/14/19	7:00	8/14/19	15:30	1	Unpreserved	X	8/14/19	15:30		
5	0-08			G	1	8/14/19	7:45	8/14/19	15:30	1	Unpreserved	X	8/14/19	15:30		
6	0-07			G	1	8/14/19	8:00	8/14/19	15:30	1	Unpreserved	X	8/14/19	15:30		
7	0-03			G	1	8/14/19	8:15	8/14/19	15:30	1	Unpreserved	X	8/14/19	15:30		
8	0-02			G	1	8/14/19	8:25	8/14/19	15:30	1	Unpreserved	X	8/14/19	15:30		
9	N4-3			G	1	8/14/19	9:00	8/14/19	15:30	1	Unpreserved	X	8/14/19	15:30		
10	N4-2			G	1	8/14/19	9:15	8/14/19	15:30	1	Unpreserved	X	8/14/19	15:30		
11	N4-1			G	1	8/14/19	9:25	8/14/19	15:30	1	Unpreserved	X	8/14/19	15:30		
12	N7-1			G	1	8/14/19	9:45	8/14/19	15:30	1	Unpreserved	X	8/14/19	15:30		

**ADDITIONAL COMMENTS**

\*see comment on p.1

Alia Grigat / TRC

Wendee Coblen

T.J. Duda

**SAMPLER NAME AND SIGNATURE**

PRINT Name of SAMPLER: \_\_\_\_\_

SIGNATURE of SAMPLER: \_\_\_\_\_

DATE Signed (MM/DD/YYYY): \_\_\_\_\_

Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

**Sample Condition Upon Receipt**      **Client Name:** TRC      **Project #:** WO#: 10487441

**Courier:**  Fed Ex     UPS     USPS     Client  
 Pace     Speedee     Commercial     See Exception

**Tracking Number:** 4638 0199 1562

**Custody Seal on Cooler/Box Present?**  Yes     No      **Seals Intact?**  Yes     No      **Biological Tissue Frozen?**  Yes     No  N/A

**Packing Material:**  Bubble Wrap     Bubble Bags     None     Other: \_\_\_\_\_      **Temp Blank?**  Yes     No

**Thermometer:**  T1(0461)     T2(1336)     T3(0459)     T4(0254)     T5(0489)      **Type of Ice:**  Wet     Blue     None     Dry     Melted

**Note: Each West Virginia Sample must have temp taken (no temp blanks)**

Temp should be above freezing to 6°C	<b>Cooler Temp Read w/temp blank:</b> <u>3.5</u> °C	<b>Average Corrected Temp (no temp blank only):</b> _____ °C
<b>Correction Factor:</b> <u>+0.1</u>	<b>Cooler Temp Corrected w/temp blank:</b> <u>3.6</u> °C	<b>See Exceptions</b> <input type="checkbox"/>

**USDA Regulated Soil:** (  N/A, water sample/Other: \_\_\_\_\_ )      **Date/Initials of Person Examining Contents:** AUM 08.15.19

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)?  Yes     No      Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)?  Yes     No

**If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.**

		COMMENTS:
Chain of Custody Present and Filled Out?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	1.
Chain of Custody Relinquished?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	2.
Sampler Name and/or Signature on COC?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	3.
Samples Arrived within Hold Time?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	4.
Short Hold Time Analysis (<72 hr)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. <input type="checkbox"/> Fecal Coliform <input type="checkbox"/> HPC <input type="checkbox"/> Total Coliform/E coli <input type="checkbox"/> BOD/cBOD <input type="checkbox"/> Hex Chrome <input type="checkbox"/> Turbidity <input type="checkbox"/> Nitrate <input type="checkbox"/> Nitrite <input type="checkbox"/> Orthophos <input type="checkbox"/> Other
Rush Turn Around Time Requested?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6.
Sufficient Volume?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	7.
Correct Containers Used? -Pace Containers Used?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	8.
Containers Intact?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.
Field Filtered Volume Received for Dissolved Tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	10. Is sediment visible in the dissolved container? <input type="checkbox"/> Yes <input type="checkbox"/> No
Is sufficient information available to reconcile the samples to the COC? Matrix: <input type="checkbox"/> Water <input checked="" type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	11. If no, write ID/ Date/Time on Container Below: _____      See Exception <input type="checkbox"/>
All containers needing acid/base preservation have been checked?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	12. Sample # _____ <input type="checkbox"/> NaOH <input type="checkbox"/> HNO <sub>3</sub> <input type="checkbox"/> H <sub>2</sub> SO <sub>4</sub> <input type="checkbox"/> Zinc Acetate
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO <sub>3</sub> , H <sub>2</sub> SO <sub>4</sub> , <2pH, NaOH >9 Sulfide, NaOH >12 Cyanide)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Positive for Res. <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No      See Exception <input type="checkbox"/>
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Chlorine? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No      pH Paper Lot# _____ Res. Chlorine    0-6 Roll    0-6 Strip    0-14 Strip
Headspace in VOA Vials (greater than 6mm)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13. _____      See Exception <input type="checkbox"/>
Trip Blank Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14. _____
Trip Blank Custody Seals Present?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Pace Trip Blank Lot # (if purchased): _____

**CLIENT NOTIFICATION/RESOLUTION**

Person Contacted: \_\_\_\_\_      Date/Time: \_\_\_\_\_      Field Data Required?  Yes     No

Comments/Resolution: \_\_\_\_\_

**Project Manager Review:** Carolynne Trout      Date: 8/15/19

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers).

Labeled by: ST (2)

**Method 1613B Blank Analysis Results**

Lab Sample Name	DFBLKWU	Matrix	Solid
Lab Sample ID	BLANK-72962	Dilution	NA
Filename	F190829A_12	Extracted	08/27/2019 15:05
Total Amount Extracted	10.7 g	Analyzed	08/29/2019 16:25
ICAL ID	F190827	Injected By	SMT
CCal Filename(s)	F190829A_01		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	84
Total TCDF	ND	----	1.0	2,3,7,8-TCDD-13C	2.00	81
				1,2,3,7,8-PeCDF-13C	2.00	79
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	82
Total TCDD	ND	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	79
				1,2,3,4,7,8-HxCDF-13C	2.00	78
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	87
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	86
Total PeCDF	ND	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	86
				1,2,3,4,7,8-HxCDD-13C	2.00	68
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	76
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	76
				1,2,3,4,7,8,9-HpCDF-13C	2.00	72
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	76
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	57
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	76
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	ND	----	5.0			
1,2,3,4,6,7,8-HpCDF	ND	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 0.00 ng/Kg		
Total HpCDF	ND	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	ND	----	5.0			
Total HpCDD	ND	----	5.0			
OCDF	ND	----	10			
OCDD	ND	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

Results reported on a total weight basis and are valid to no more than 2 significant figures.

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Blank Analysis Results**

Lab Sample Name	DFBLKWZ	Matrix	Solid
Lab Sample ID	BLANK-72988	Dilution	NA
Filename	F190830A_06	Extracted	08/28/2019 15:05
Total Amount Extracted	10.1 g	Analyzed	08/30/2019 13:45
ICAL ID	F190827	Injected By	ZMS
CCal Filename(s)	F190830A_03		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	-----	1.0	2,3,7,8-TCDF-13C	2.00	91
Total TCDF	ND	-----	1.0	2,3,7,8-TCDD-13C	2.00	88
				1,2,3,7,8-PeCDF-13C	2.00	89
2,3,7,8-TCDD	ND	-----	1.0	2,3,4,7,8-PeCDF-13C	2.00	87
Total TCDD	ND	-----	1.0	1,2,3,7,8-PeCDD-13C	2.00	89
				1,2,3,4,7,8-HxCDF-13C	2.00	92
1,2,3,7,8-PeCDF	ND	-----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	105
2,3,4,7,8-PeCDF	ND	-----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	102
Total PeCDF	ND	-----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	100
				1,2,3,4,7,8-HxCDD-13C	2.00	83
1,2,3,7,8-PeCDD	ND	-----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	84
Total PeCDD	ND	-----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	100
				1,2,3,4,7,8,9-HpCDF-13C	2.00	96
1,2,3,4,7,8-HxCDF	ND	-----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	98
1,2,3,6,7,8-HxCDF	ND	-----	5.0	OCDD-13C	4.00	84
2,3,4,6,7,8-HxCDF	ND	-----	5.0			
1,2,3,7,8,9-HxCDF	ND	-----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	-----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	5.0	2,3,7,8-TCDD-37Cl4	0.20	74
1,2,3,6,7,8-HxCDD	ND	-----	5.0			
1,2,3,7,8,9-HxCDD	ND	-----	5.0			
Total HxCDD	ND	-----	5.0			
1,2,3,4,6,7,8-HpCDF	ND	-----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	5.0	Equivalence: 0.00 ng/Kg		
Total HpCDF	ND	-----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	ND	-----	5.0			
Total HpCDD	ND	-----	5.0			
OCDF	ND	-----	10			
OCDD	ND	-----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

Results reported on a total weight basis and are valid to no more than 2 significant figures.

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Report No.....10487441

**Method 1613B Blank Analysis Results**

Lab Sample Name	DFBLKXD	Matrix	Solid
Lab Sample ID	BLANK-73004	Dilution	NA
Filename	F190830B_07	Extracted	08/28/2019 15:05
Total Amount Extracted	20.7 g	Analyzed	08/30/2019 21:33
ICAL ID	F190827	Injected By	JRH
CCal Filename(s)	F190830A_09		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	-----	1.0	2,3,7,8-TCDF-13C	2.00	65
Total TCDF	ND	-----	1.0	2,3,7,8-TCDD-13C	2.00	75
				1,2,3,7,8-PeCDF-13C	2.00	71
2,3,7,8-TCDD	ND	-----	1.0	2,3,4,7,8-PeCDF-13C	2.00	75
Total TCDD	ND	-----	1.0	1,2,3,7,8-PeCDD-13C	2.00	82
				1,2,3,4,7,8-HxCDF-13C	2.00	73
1,2,3,7,8-PeCDF	ND	-----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	79
2,3,4,7,8-PeCDF	ND	-----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	77
Total PeCDF	ND	-----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	78
				1,2,3,4,7,8-HxCDD-13C	2.00	70
1,2,3,7,8-PeCDD	ND	-----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	69
Total PeCDD	ND	-----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	82
				1,2,3,4,7,8,9-HpCDF-13C	2.00	85
1,2,3,4,7,8-HxCDF	ND	-----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	90
1,2,3,6,7,8-HxCDF	ND	-----	5.0	OCDD-13C	4.00	79
2,3,4,6,7,8-HxCDF	ND	-----	5.0			
1,2,3,7,8,9-HxCDF	ND	-----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	-----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	5.0	2,3,7,8-TCDD-37Cl4	0.20	72
1,2,3,6,7,8-HxCDD	ND	-----	5.0			
1,2,3,7,8,9-HxCDD	ND	-----	5.0			
Total HxCDD	ND	-----	5.0			
1,2,3,4,6,7,8-HpCDF	ND	-----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	5.0	Equivalence: 0.00 ng/Kg		
Total HpCDF	ND	-----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	ND	-----	5.0			
Total HpCDD	ND	-----	5.0			
OCDF	ND	-----	10			
OCDD	ND	-----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

RL = Reporting Limit

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Report No.....10487441



**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N6-1				
Lab Sample ID	10487441001				
Filename	U190830B_03				
Injected By	SMT				
Total Amount Extracted	12.8 g	Matrix	Solid		
% Moisture	9.3	Dilution	NA		
Dry Weight Extracted	11.6 g	Collected	08/13/2019 08:00		
ICAL ID	U190730	Received	08/15/2019 08:40		
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05		
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 11:41		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	91
Total TCDF	1.3	----	1.0	2,3,7,8-TCDD-13C	2.00	91
				1,2,3,7,8-PeCDF-13C	2.00	94
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	92
Total TCDD	ND	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	102
				1,2,3,4,7,8-HxCDF-13C	2.00	80 DN2
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	74 DN2
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	71 DN2
Total PeCDF	7.9	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	57 DN2
				1,2,3,4,7,8-HxCDD-13C	2.00	84 DN2
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	67 DN2
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	63 DN2
				1,2,3,4,7,8,9-HpCDF-13C	2.00	64 DN2
1,2,3,4,7,8-HxCDF	ND	----	5.0 DN2	1,2,3,4,6,7,8-HpCDD-13C	2.00	68 DN2
1,2,3,6,7,8-HxCDF	ND	----	5.0 DN2	OCDD-13C	4.00	48 DN2
2,3,4,6,7,8-HxCDF	ND	----	5.0 DN2			
1,2,3,7,8,9-HxCDF	ND	----	5.0 DN2	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	5.2	----	5.0 JDN2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0 DN2	2,3,7,8-TCDD-37Cl4	0.20	87
1,2,3,6,7,8-HxCDD	ND	----	5.0 DN2			
1,2,3,7,8,9-HxCDD	ND	----	5.0 DN2			
Total HxCDD	ND	----	5.0 DN2			
1,2,3,4,6,7,8-HpCDF	7.0	----	5.0 JDN2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0 DN2	Equivalence: 0.43 ng/Kg		
Total HpCDF	15	----	5.0 JDN2	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	19	----	5.0 JDN2			
Total HpCDD	39	----	5.0 DN2			
OCDF	11	----	10 JDN2			
OCDD	160	----	10 DN2			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit  
 ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
 J = Estimated value  
 D = Result obtained from analysis of diluted sample  
 Nn = Value obtained from additional analysis

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N6-2		
Lab Sample ID	10487441002		
Filename	U190830B_04		
Injected By	SMT		
Total Amount Extracted	11.8 g	Matrix	Solid
% Moisture	11.4	Dilution	NA
Dry Weight Extracted	10.5 g	Collected	08/13/2019 08:16
ICAL ID	U190730	Received	08/15/2019 08:40
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 12:24

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	81
Total TCDF	19	----	1.0	2,3,7,8-TCDD-13C	2.00	83
				1,2,3,7,8-PeCDF-13C	2.00	85
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	85
Total TCDD	1.7	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	92
				1,2,3,4,7,8-HxCDF-13C	2.00	90 DN2
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	84 DN2
2,3,4,7,8-PeCDF	5.0	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	82 DN2
Total PeCDF	57	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	42 DN2
				1,2,3,4,7,8-HxCDD-13C	2.00	98 DN2
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	77 DN2
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	75 DN2
				1,2,3,4,7,8,9-HpCDF-13C	2.00	77 DN2
1,2,3,4,7,8-HxCDF	ND	----	5.0 DN2	1,2,3,4,6,7,8-HpCDD-13C	2.00	79 DN2
1,2,3,6,7,8-HxCDF	ND	----	5.0 DN2	OCDD-13C	4.00	68 DN2
2,3,4,6,7,8-HxCDF	ND	----	5.0 DN2			
1,2,3,7,8,9-HxCDF	ND	----	5.0 DN2	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	60	----	5.0 DN2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0 DN2	2,3,7,8-TCDD-37Cl4	0.20	78
1,2,3,6,7,8-HxCDD	5.1	----	5.0 JDN2			
1,2,3,7,8,9-HxCDD	ND	----	5.0 DN2			
Total HxCDD	33	----	5.0 DN2			
1,2,3,4,6,7,8-HpCDF	34	----	5.0 DN2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0 DN2	Equivalence: 5.3 ng/Kg		
Total HpCDF	89	----	5.0 DN2	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	96	----	5.0 DN2			
Total HpCDD	200	----	5.0 DN2			
OCDF	73	----	10 DN2			
OCDD	860	----	10 DN2			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

RL = Reporting Limit

ND = Not Detected

NA = Not Applicable

NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

J = Estimated value

D = Result obtained from analysis of diluted sample

Nn = Value obtained from additional analysis

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

## Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N6-4		
Lab Sample ID	10487441003		
Filename	U190830B_05		
Injected By	SMT		
Total Amount Extracted	11.4 g	Matrix	Solid
% Moisture	11.9	Dilution	NA
Dry Weight Extracted	10.0 g	Collected	08/13/2019 08:40
ICAL ID	U190730	Received	08/15/2019 08:40
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 13:08

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	83
Total TCDF	23	----	1.0	2,3,7,8-TCDD-13C	2.00	84
				1,2,3,7,8-PeCDF-13C	2.00	84
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	84
Total TCDD	3.1	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	92
				1,2,3,4,7,8-HxCDF-13C	2.00	74 DN2
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	66 DN2
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	66 DN2
Total PeCDF	39	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	52 DN2
				1,2,3,4,7,8-HxCDD-13C	2.00	79 DN2
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	61 DN2
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	61 DN2
				1,2,3,4,7,8,9-HpCDF-13C	2.00	64 DN2
1,2,3,4,7,8-HxCDF	ND	----	5.0 DN2	1,2,3,4,6,7,8-HpCDD-13C	2.00	67 DN2
1,2,3,6,7,8-HxCDF	ND	----	5.0 DN2	OCDD-13C	4.00	51 DN2
2,3,4,6,7,8-HxCDF	ND	----	5.0 DN2			
1,2,3,7,8,9-HxCDF	ND	----	5.0 DN2	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	37	----	5.0 DN2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0 DN2	2,3,7,8-TCDD-37Cl4	0.20	76
1,2,3,6,7,8-HxCDD	ND	----	5.0 DN2			
1,2,3,7,8,9-HxCDD	ND	----	5.0 DN2			
Total HxCDD	14	----	5.0 JDN2			
1,2,3,4,6,7,8-HpCDF	17	----	5.0 JDN2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0 DN2	Equivalence: 0.91 ng/Kg		
Total HpCDF	43	----	5.0 DN2	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	39	----	5.0 DN2			
Total HpCDD	78	----	5.0 DN2			
OCDF	40	----	10 JDN2			
OCDD	310	----	10 DN2			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
 J = Estimated value  
 D = Result obtained from analysis of diluted sample  
 Nn = Value obtained from additional analysis

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N6-3		
Lab Sample ID	10487441004		
Filename	U190830B_06		
Injected By	SMT		
Total Amount Extracted	11.6 g	Matrix	Solid
% Moisture	10.2	Dilution	NA
Dry Weight Extracted	10.4 g	Collected	08/13/2019 09:00
ICAL ID	U190730	Received	08/15/2019 08:40
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 13:51

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	79
Total TCDF	1.7	----	1.0	2,3,7,8-TCDD-13C	2.00	78
				1,2,3,7,8-PeCDF-13C	2.00	76
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	79
Total TCDD	ND	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	83
				1,2,3,4,7,8-HxCDF-13C	2.00	81
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	70
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	75
Total PeCDF	7.3	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	45
				1,2,3,4,7,8-HxCDD-13C	2.00	79
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	61
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	64
				1,2,3,4,7,8,9-HpCDF-13C	2.00	71
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	71
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	58
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	13	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	80
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	7.4	----	5.0			
1,2,3,4,6,7,8-HpCDF	12	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 1.1 ng/Kg		
Total HpCDF	33	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	51	----	5.0			
Total HpCDD	91	----	5.0			
OCDF	43	----	10			
OCDD	460	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit  
 ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N2-1		
Lab Sample ID	10487441005		
Filename	U190830B_07		
Injected By	SMT		
Total Amount Extracted	12.1 g	Matrix	Solid
% Moisture	17.6	Dilution	NA
Dry Weight Extracted	10.0 g	Collected	08/13/2019 09:35
ICAL ID	U190730	Received	08/15/2019 08:40
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 14:35

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	87
Total TCDF	14	----	1.0	2,3,7,8-TCDD-13C	2.00	87
				1,2,3,7,8-PeCDF-13C	2.00	88
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	91
Total TCDD	2.3	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	92
				1,2,3,4,7,8-HxCDF-13C	2.00	81
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	77
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	79
Total PeCDF	28	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	57
				1,2,3,4,7,8-HxCDD-13C	2.00	87
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	65
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	70
				1,2,3,4,7,8,9-HpCDF-13C	2.00	79
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	83
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	64
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	18	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	79
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	12	----	5.0			
1,2,3,4,6,7,8-HpCDF	13	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 0.74 ng/Kg		
Total HpCDF	27	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	34	----	5.0			
Total HpCDD	63	----	5.0			
OCDF	18	----	10			
OCDD	250	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N2-2		
Lab Sample ID	10487441006		
Filename	U190830B_08		
Injected By	SMT		
Total Amount Extracted	11.7 g	Matrix	Solid
% Moisture	14.4	Dilution	NA
Dry Weight Extracted	10.00 g	Collected	08/13/2019 09:45
ICAL ID	U190730	Received	08/15/2019 08:40
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 15:18

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	67
Total TCDF	44	----	1.0	2,3,7,8-TCDD-13C	2.00	67
				1,2,3,7,8-PeCDF-13C	2.00	68
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	72
Total TCDD	2.2	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	74
				1,2,3,4,7,8-HxCDF-13C	2.00	66
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	56
2,3,4,7,8-PeCDF	6.8	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	60
Total PeCDF	130	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	48
				1,2,3,4,7,8-HxCDD-13C	2.00	71
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	45
Total PeCDD	12	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	55
				1,2,3,4,7,8,9-HpCDF-13C	2.00	67
1,2,3,4,7,8-HxCDF	12	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	68
1,2,3,6,7,8-HxCDF	-----	9.1	5.0	OCDD-13C	4.00	63
2,3,4,6,7,8-HxCDF	5.6	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	230	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	7.2	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	63
1,2,3,6,7,8-HxCDD	22	----	5.0			
1,2,3,7,8,9-HxCDD	13	----	5.0			
Total HxCDD	130	----	5.0			
1,2,3,4,6,7,8-HpCDF	160	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	11	----	5.0	Equivalence: 19 ng/Kg		
Total HpCDF	420	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	400	----	5.0			
Total HpCDD	670	----	5.0			
OCDF	310	----	10			
OCDD	3000	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
 P = PCDE Interference

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N2-4		
Lab Sample ID	10487441007		
Filename	U190830B_09		
Injected By	SMT		
Total Amount Extracted	12.0 g	Matrix	Solid
% Moisture	14.9	Dilution	NA
Dry Weight Extracted	10.2 g	Collected	08/13/2019 10:05
ICAL ID	U190730	Received	08/15/2019 08:40
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 16:01

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	1.8	----	1.0 C	2,3,7,8-TCDF-13C	2.00	83
Total TCDF	55	----	1.0	2,3,7,8-TCDD-13C	2.00	84
				1,2,3,7,8-PeCDF-13C	2.00	89
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	76
Total TCDD	2.0	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	84
				1,2,3,4,7,8-HxCDF-13C	2.00	128
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	113
2,3,4,7,8-PeCDF	13	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	119
Total PeCDF	160	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	120
				1,2,3,4,7,8-HxCDD-13C	2.00	137
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	102
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	111
				1,2,3,4,7,8,9-HpCDF-13C	2.00	126
1,2,3,4,7,8-HxCDF	6.1	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	137
1,2,3,6,7,8-HxCDF	6.0	----	5.0	OCDD-13C	4.00	129
2,3,4,6,7,8-HxCDF	6.1	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	150	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	75
1,2,3,6,7,8-HxCDD	11	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	61	----	5.0			
1,2,3,4,6,7,8-HpCDF	94	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 15 ng/Kg		
Total HpCDF	210	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	210	----	5.0			
Total HpCDD	350	----	5.0			
OCDF	130	----	10			
OCDD	1600	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

RL = Reporting Limit

ND = Not Detected

NA = Not Applicable

NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

C = Result obtained from confirmation analysis

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N2-3		
Lab Sample ID	10487441008		
Filename	U190830B_10		
Injected By	SMT		
Total Amount Extracted	11.6 g	Matrix	Solid
% Moisture	13.2	Dilution	NA
Dry Weight Extracted	10.0 g	Collected	08/13/2019 10:15
ICAL ID	U190730	Received	08/15/2019 08:40
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 16:44

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	82
Total TCDF	39	----	1.0	2,3,7,8-TCDD-13C	2.00	82
				1,2,3,7,8-PeCDF-13C	2.00	83
2,3,7,8-TCDD	16	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	84
Total TCDD	19	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	87
				1,2,3,4,7,8-HxCDF-13C	2.00	79
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	66
2,3,4,7,8-PeCDF	5.7	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	68
Total PeCDF	110	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	49
				1,2,3,4,7,8-HxCDD-13C	2.00	76
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	59
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	64
				1,2,3,4,7,8,9-HpCDF-13C	2.00	78
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	74
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	68
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	69	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	74
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	25	----	5.0			
1,2,3,4,6,7,8-HpCDF	32	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 20 ng/Kg		
Total HpCDF	69	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	72	----	5.0			
Total HpCDD	130	----	5.0			
OCDF	59	----	10			
OCDD	520	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
RL = Reporting Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N2-5		
Lab Sample ID	10487441009		
Filename	U190830B_11		
Injected By	SMT		
Total Amount Extracted	12.0 g	Matrix	Solid
% Moisture	14.6	Dilution	NA
Dry Weight Extracted	10.2 g	Collected	08/13/2019 10:30
ICAL ID	U190730	Received	08/15/2019 08:40
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 17:28

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	85
Total TCDF	8.1	----	1.0	2,3,7,8-TCDD-13C	2.00	84
				1,2,3,7,8-PeCDF-13C	2.00	87
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	85
Total TCDD	1.2	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	91
				1,2,3,4,7,8-HxCDF-13C	2.00	129
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	114
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	124
Total PeCDF	13	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	59
				1,2,3,4,7,8-HxCDD-13C	2.00	132
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	104
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	117
				1,2,3,4,7,8,9-HpCDF-13C	2.00	131
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	134
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	124
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	20	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	75
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	35	----	5.0			
1,2,3,4,6,7,8-HpCDF	20	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 1.8 ng/Kg		
Total HpCDF	43	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	100	----	5.0			
Total HpCDD	230	----	5.0			
OCDF	34	----	10			
OCDD	610	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
RL = Reporting Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

## REPORT OF LABORATORY ANALYSIS

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N5-2A		
Lab Sample ID	10487441010		
Filename	U190830B_12		
Injected By	SMT		
Total Amount Extracted	12.4 g	Matrix	Solid
% Moisture	16.9	Dilution	NA
Dry Weight Extracted	10.3 g	Collected	08/13/2019 11:05
ICAL ID	U190730	Received	08/15/2019 08:40
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 18:11

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	79
Total TCDF	3.9	----	1.0	2,3,7,8-TCDD-13C	2.00	79
				1,2,3,7,8-PeCDF-13C	2.00	77
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	78
Total TCDD	ND	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	82
				1,2,3,4,7,8-HxCDF-13C	2.00	113
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	99
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	106
Total PeCDF	16	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	50
				1,2,3,4,7,8-HxCDD-13C	2.00	115
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	86
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	93
				1,2,3,4,7,8,9-HpCDF-13C	2.00	107
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	109
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	90
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	46	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	75
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	24	----	5.0			
1,2,3,4,6,7,8-HpCDF	27	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 1.8 ng/Kg		
Total HpCDF	68	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	76	----	5.0			
Total HpCDD	140	----	5.0			
OCDF	65	----	10			
OCDD	660	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441



**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N5-1A		
Lab Sample ID	10487441011		
Filename	U190830B_13		
Injected By	SMT		
Total Amount Extracted	11.5 g	Matrix	Solid
% Moisture	12.7	Dilution	NA
Dry Weight Extracted	10.0 g	Collected	08/13/2019 11:15
ICAL ID	U190730	Received	08/15/2019 08:40
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 18:54

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	100
Total TCDF	1.9	----	1.0	2,3,7,8-TCDD-13C	2.00	100
				1,2,3,7,8-PeCDF-13C	2.00	96
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	98
Total TCDD	ND	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	106
				1,2,3,4,7,8-HxCDF-13C	2.00	80 DN2
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	78 DN2
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	74 DN2
Total PeCDF	13	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	76 DN2
				1,2,3,4,7,8-HxCDD-13C	2.00	86 DN2
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	73 DN2
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	67 DN2
				1,2,3,4,7,8,9-HpCDF-13C	2.00	68 DN2
1,2,3,4,7,8-HxCDF	ND	----	5.0 DN2	1,2,3,4,6,7,8-HpCDD-13C	2.00	75 DN2
1,2,3,6,7,8-HxCDF	ND	----	5.0 DN2	OCDD-13C	4.00	51 DN2
2,3,4,6,7,8-HxCDF	ND	----	5.0 DN2			
1,2,3,7,8,9-HxCDF	ND	----	5.0 DN2	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	17	----	5.0 JDN2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0 DN2	2,3,7,8-TCDD-37Cl4	0.20	95
1,2,3,6,7,8-HxCDD	ND	----	5.0 DN2			
1,2,3,7,8,9-HxCDD	ND	----	5.0 DN2			
Total HxCDD	6.1	----	5.0 JDN2			
1,2,3,4,6,7,8-HpCDF	11	----	5.0 JDN2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0 DN2	Equivalence: 0.84 ng/Kg		
Total HpCDF	11	----	5.0 JDN2	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	37	----	5.0 DN2			
Total HpCDD	81	----	5.0 DN2			
OCDF	25	----	10 JDN2			
OCDD	340	----	10 DN2			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

J = Estimated value

D = Result obtained from analysis of diluted sample

Nn = Value obtained from additional analysis

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N5-3		
Lab Sample ID	10487441012		
Filename	U190830B_14		
Injected By	SMT		
Total Amount Extracted	11.8 g	Matrix	Solid
% Moisture	13.6	Dilution	NA
Dry Weight Extracted	10.2 g	Collected	08/13/2019 11:25
ICAL ID	U190730	Received	08/15/2019 08:40
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 19:38

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	80
Total TCDF	1.4	----	1.0	2,3,7,8-TCDD-13C	2.00	82
				1,2,3,7,8-PeCDF-13C	2.00	75
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	74
Total TCDD	ND	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	80
				1,2,3,4,7,8-HxCDF-13C	2.00	95 DN2
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	85 DN2
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	79 DN2
Total PeCDF	7.7	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	43 DN2
				1,2,3,4,7,8-HxCDD-13C	2.00	94 DN2
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	79 DN2
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	65 DN2
				1,2,3,4,7,8,9-HpCDF-13C	2.00	66 DN2
1,2,3,4,7,8-HxCDF	ND	----	5.0 DN2	1,2,3,4,6,7,8-HpCDD-13C	2.00	67 DN2
1,2,3,6,7,8-HxCDF	ND	----	5.0 DN2	OCDD-13C	4.00	48 DN2
2,3,4,6,7,8-HxCDF	ND	----	5.0 DN2			
1,2,3,7,8,9-HxCDF	ND	----	5.0 DN2	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	32	----	5.0 DN2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0 DN2	2,3,7,8-TCDD-37Cl4	0.20	75
1,2,3,6,7,8-HxCDD	5.1	----	5.0 JDN2			
1,2,3,7,8,9-HxCDD	ND	----	5.0 DN2			
Total HxCDD	25	----	5.0 DN2			
1,2,3,4,6,7,8-HpCDF	23	----	5.0 JDN2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0 DN2	Equivalence: 3.1 ng/Kg		
Total HpCDF	58	----	5.0 DN2	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	100	----	5.0 DN2			
Total HpCDD	230	----	5.0 DN2			
OCDF	47	----	10 JDN2			
OCDD	1200	----	10 DN2			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit  
 ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

J = Estimated value

D = Result obtained from analysis of diluted sample

Nn = Value obtained from additional analysis

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N5-4		
Lab Sample ID	10487441013		
Filename	U190830B_15		
Injected By	SMT		
Total Amount Extracted	12.1 g	Matrix	Solid
% Moisture	16.6	Dilution	NA
Dry Weight Extracted	10.1 g	Collected	08/13/2019 11:35
ICAL ID	U190730	Received	08/15/2019 08:40
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 20:21

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	89
Total TCDF	4.8	----	1.0	2,3,7,8-TCDD-13C	2.00	89
				1,2,3,7,8-PeCDF-13C	2.00	86
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	89
Total TCDD	ND	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	94
				1,2,3,4,7,8-HxCDF-13C	2.00	125
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	108
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	114
Total PeCDF	21	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	66
				1,2,3,4,7,8-HxCDD-13C	2.00	120
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	96
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	106
				1,2,3,4,7,8,9-HpCDF-13C	2.00	116
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	120
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	105
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	95	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	79
1,2,3,6,7,8-HxCDD	38	----	5.0			
1,2,3,7,8,9-HxCDD	5.1	----	5.0			
Total HxCDD	130	----	5.0			
1,2,3,4,6,7,8-HpCDF	55	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 15 ng/Kg		
Total HpCDF	170	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	580	----	5.0			
Total HpCDD	960	----	5.0			
OCDF	230	----	10			
OCDD	4200	----	10 E			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
 E = Exceeds calibration range

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N3-4		
Lab Sample ID	10487441014		
Filename	Y190830A_10		
Injected By	ZMS		
Total Amount Extracted	11.8 g	Matrix	Solid
% Moisture	14.5	Dilution	NA
Dry Weight Extracted	10.1 g	Collected	08/13/2019 12:50
ICAL ID	Y190827	Received	08/15/2019 08:40
CCal Filename(s)	Y190830A_02	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/30/2019 15:46

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	82
Total TCDF	ND	----	1.0	2,3,7,8-TCDD-13C	2.00	77
				1,2,3,7,8-PeCDF-13C	2.00	70
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	68
Total TCDD	ND	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	69
				1,2,3,4,7,8-HxCDF-13C	2.00	82
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	82
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	84
Total PeCDF	ND	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	78
				1,2,3,4,7,8-HxCDD-13C	2.00	79
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	72
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	70
				1,2,3,4,7,8,9-HpCDF-13C	2.00	70
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	69
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	57
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	82
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	ND	----	5.0			
1,2,3,4,6,7,8-HpCDF	ND	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 0.20 ng/Kg		
Total HpCDF	ND	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	11	----	5.0			
Total HpCDD	21	----	5.0			
OCDF	ND	----	10			
OCDD	90	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

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**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N3-3		
Lab Sample ID	10487441015		
Filename	Y190830A_11		
Injected By	ZMS		
Total Amount Extracted	11.9 g	Matrix	Solid
% Moisture	12.9	Dilution	NA
Dry Weight Extracted	10.3 g	Collected	08/13/2019 13:00
ICAL ID	Y190827	Received	08/15/2019 08:40
CCal Filename(s)	Y190830A_02	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/30/2019 16:31

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	84
Total TCDF	ND	----	1.0	2,3,7,8-TCDD-13C	2.00	80
				1,2,3,7,8-PeCDF-13C	2.00	80
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	85
Total TCDD	ND	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	88
				1,2,3,4,7,8-HxCDF-13C	2.00	78
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	81
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	82
Total PeCDF	ND	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	64
				1,2,3,4,7,8-HxCDD-13C	2.00	83
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	67
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	68
				1,2,3,4,7,8-HpCDF-13C	2.00	69
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	67
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	62
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	82
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	ND	----	5.0			
1,2,3,4,6,7,8-HpCDF	6.1	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 0.31 ng/Kg		
Total HpCDF	13	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	14	----	5.0			
Total HpCDD	28	----	5.0			
OCDF	ND	----	10			
OCDD	110	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N3-2		
Lab Sample ID	10487441016		
Filename	Y190830A_12		
Injected By	ZMS		
Total Amount Extracted	11.3 g	Matrix	Solid
% Moisture	9.6	Dilution	NA
Dry Weight Extracted	10.2 g	Collected	08/13/2019 13:10
ICAL ID	Y190827	Received	08/15/2019 08:40
CCal Filename(s)	Y190830A_02	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/30/2019 17:17

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	75
Total TCDF	3.9	----	1.0	2,3,7,8-TCDD-13C	2.00	72
				1,2,3,7,8-PeCDF-13C	2.00	75
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	76
Total TCDD	8.1	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	77
				1,2,3,4,7,8-HxCDF-13C	2.00	77
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	75
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	76
Total PeCDF	6.4	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	76
				1,2,3,4,7,8-HxCDD-13C	2.00	72
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	67
Total PeCDD	16	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	67
				1,2,3,4,7,8,9-HpCDF-13C	2.00	68
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	67
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	64
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	17	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	77
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	43	----	5.0			
1,2,3,4,6,7,8-HpCDF	26	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 0.90 ng/Kg		
Total HpCDF	42	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	39	----	5.0			
Total HpCDD	79	----	5.0			
OCDF	34	----	10			
OCDD	220	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

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**REPORT OF LABORATORY ANALYSIS**

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Report No..... 10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N3-1		
Lab Sample ID	10487441017		
Filename	Y190830A_13		
Injected By	ZMS		
Total Amount Extracted	10.9 g	Matrix	Solid
% Moisture	8.0	Dilution	NA
Dry Weight Extracted	10.1 g	Collected	08/13/2019 13:20
ICAL ID	Y190827	Received	08/15/2019 08:40
CCal Filename(s)	Y190830A_02	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/30/2019 18:03

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	80
Total TCDF	10	----	1.0	2,3,7,8-TCDD-13C	2.00	77
				1,2,3,7,8-PeCDF-13C	2.00	79
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	80
Total TCDD	14	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	82
				1,2,3,4,7,8-HxCDF-13C	2.00	74
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	77
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	76
Total PeCDF	21	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	66
				1,2,3,4,7,8-HxCDD-13C	2.00	76
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	65
Total PeCDD	34	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	65
				1,2,3,4,7,8,9-HpCDF-13C	2.00	66
1,2,3,4,7,8-HxCDF	5.3	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	64
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	73
2,3,4,6,7,8-HxCDF	6.1	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	46	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	79
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	70	----	5.0			
1,2,3,4,6,7,8-HpCDF	44	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 2.5 ng/Kg		
Total HpCDF	72	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	58	----	5.0			
Total HpCDD	120	----	5.0			
OCDF	50	----	10			
OCDD	320	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
RL = Reporting Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

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**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N1-2		
Lab Sample ID	10487441018		
Filename	Y190830A_14		
Injected By	ZMS		
Total Amount Extracted	11.8 g	Matrix	Solid
% Moisture	12.8	Dilution	NA
Dry Weight Extracted	10.3 g	Collected	08/13/2019 13:40
ICAL ID	Y190827	Received	08/15/2019 08:40
CCal Filename(s)	Y190830A_02	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/30/2019 18:48

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	1.9	----	1.0 C	2,3,7,8-TCDF-13C	2.00	74
Total TCDF	57	----	1.0	2,3,7,8-TCDD-13C	2.00	71
				1,2,3,7,8-PeCDF-13C	2.00	75
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	74
Total TCDD	4.6	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	79
				1,2,3,4,7,8-HxCDF-13C	2.00	74
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	75
2,3,4,7,8-PeCDF	12	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	76
Total PeCDF	170	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	69
				1,2,3,4,7,8-HxCDD-13C	2.00	74
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	64
Total PeCDD	6.7	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	66
				1,2,3,4,7,8,9-HpCDF-13C	2.00	68
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	65
1,2,3,6,7,8-HxCDF	5.5	----	5.0	OCDD-13C	4.00	61
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	91	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	75
1,2,3,6,7,8-HxCDD	6.6	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	55	----	5.0			
1,2,3,4,6,7,8-HpCDF	60	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 11 ng/Kg		
Total HpCDF	130	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	180	----	5.0			
Total HpCDD	340	----	5.0			
OCDF	85	----	10			
OCDD	1800	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

RL = Reporting Limit

ND = Not Detected

NA = Not Applicable

NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

C = Result obtained from confirmation analysis

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N1-3		
Lab Sample ID	10487441019		
Filename	Y190830A_15		
Injected By	ZMS		
Total Amount Extracted	11.6 g	Matrix	Solid
% Moisture	9.7	Dilution	NA
Dry Weight Extracted	10.4 g	Collected	08/13/2019 14:25
ICAL ID	Y190827	Received	08/15/2019 08:40
CCal Filename(s)	Y190830A_02	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/30/2019 19:34

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	67
Total TCDF	ND	----	1.0	2,3,7,8-TCDD-13C	2.00	65
				1,2,3,7,8-PeCDF-13C	2.00	69
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	68
Total TCDD	ND	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	72
				1,2,3,4,7,8-HxCDF-13C	2.00	72
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	63
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	64
Total PeCDF	ND	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	54
				1,2,3,4,7,8-HxCDD-13C	2.00	67
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	54
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	57
				1,2,3,4,7,8,9-HpCDF-13C	2.00	56
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	56
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	44
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	68
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	ND	----	5.0			
1,2,3,4,6,7,8-HpCDF	6.5	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 0.47 ng/Kg		
Total HpCDF	14	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	20	----	5.0			
Total HpCDD	42	----	5.0			
OCDF	18	----	10			
OCDD	190	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
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**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N1-1		
Lab Sample ID	10487441020		
Filename	F190831A_03		
Injected By	JRH		
Total Amount Extracted	12.0 g	Matrix	Solid
% Moisture	11.0	Dilution	NA
Dry Weight Extracted	10.6 g	Collected	08/13/2019 14:40
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 06:00

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	69
Total TCDF	2.5	----	1.0	2,3,7,8-TCDD-13C	2.00	78
				1,2,3,7,8-PeCDF-13C	2.00	74
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	72
Total TCDD	1.4	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	83
				1,2,3,4,7,8-HxCDF-13C	2.00	66
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	71
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	69
Total PeCDF	10	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	72
				1,2,3,4,7,8-HxCDD-13C	2.00	65
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	69
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	77
				1,2,3,4,7,8,9-HpCDF-13C	2.00	84
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	93
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	74
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	5.9	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	72
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	7.8	----	5.0			
1,2,3,4,6,7,8-HpCDF	8.8	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 1.3 ng/Kg		
Total HpCDF	27	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	54	----	5.0			
Total HpCDD	100	----	5.0			
OCDF	27	----	10			
OCDD	600	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
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**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N1-5		
Lab Sample ID	10487441021		
Filename	F190831A_04		
Injected By	JRH		
Total Amount Extracted	11.4 g	Matrix	Solid
% Moisture	11.3	Dilution	NA
Dry Weight Extracted	10.1 g	Collected	08/13/2019 14:45
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 06:46

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	75
Total TCDF	6.4	----	1.0	2,3,7,8-TCDD-13C	2.00	87
				1,2,3,7,8-PeCDF-13C	2.00	79
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	79
Total TCDD	1.3	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	92
				1,2,3,4,7,8-HxCDF-13C	2.00	84
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	83
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	80
Total PeCDF	18	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	72
				1,2,3,4,7,8-HxCDD-13C	2.00	84
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	78
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	76
				1,2,3,4,7,8,9-HpCDF-13C	2.00	74
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	88
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	53
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	15	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	83
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	20	----	5.0			
1,2,3,4,6,7,8-HpCDF	11	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 1.5 ng/Kg		
Total HpCDF	26	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	71	----	5.0			
Total HpCDD	140	----	5.0			
OCDF	28	----	10			
OCDD	640	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N1-4		
Lab Sample ID	10487441022		
Filename	F190831A_05		
Injected By	JRH		
Total Amount Extracted	11.5 g	Matrix	Solid
% Moisture	10.5	Dilution	NA
Dry Weight Extracted	10.3 g	Collected	08/13/2019 15:00
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 07:32

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	61
Total TCDF	1.4	----	1.0	2,3,7,8-TCDD-13C	2.00	71
				1,2,3,7,8-PeCDF-13C	2.00	68
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	66
Total TCDD	2.8	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	78
				1,2,3,4,7,8-HxCDF-13C	2.00	66
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	66
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	68
Total PeCDF	5.2	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	65
				1,2,3,4,7,8-HxCDD-13C	2.00	69
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	63
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	71
				1,2,3,4,7,8,9-HpCDF-13C	2.00	74
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	85
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	61
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	66
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	ND	----	5.0			
1,2,3,4,6,7,8-HpCDF	8.1	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 0.37 ng/Kg		
Total HpCDF	16	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	16	----	5.0			
Total HpCDD	32	----	5.0			
OCDF	17	----	10			
OCDD	120	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
RL = Reporting Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

## REPORT OF LABORATORY ANALYSIS

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	O-10		
Lab Sample ID	10487441023		
Filename	F190831A_06		
Injected By	JRH		
Total Amount Extracted	13.1 g	Matrix	Solid
% Moisture	21.7	Dilution	NA
Dry Weight Extracted	10.3 g	Collected	08/13/2019 15:30
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 08:18

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	54
Total TCDF	7.8	----	1.0	2,3,7,8-TCDD-13C	2.00	63
				1,2,3,7,8-PeCDF-13C	2.00	56
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	58
Total TCDD	1.7	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	67
				1,2,3,4,7,8-HxCDF-13C	2.00	56
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	57
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	57
Total PeCDF	31	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	55
				1,2,3,4,7,8-HxCDD-13C	2.00	59
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	53
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	61
				1,2,3,4,7,8,9-HpCDF-13C	2.00	64
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	74
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	54
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	24	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	58
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	21	----	5.0			
1,2,3,4,6,7,8-HpCDF	25	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 1.6 ng/Kg		
Total HpCDF	55	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	70	----	5.0			
Total HpCDD	140	----	5.0			
OCDF	45	----	10			
OCDD	570	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
RL = Reporting Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

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**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	O-09		
Lab Sample ID	10487441024		
Filename	F190831A_07		
Injected By	JRH		
Total Amount Extracted	11.8 g	Matrix	Solid
% Moisture	11.3	Dilution	NA
Dry Weight Extracted	10.5 g	Collected	08/13/2019 15:45
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 09:04

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	1.6	-----	1.0 C	2,3,7,8-TCDF-13C	2.00	67
Total TCDF	52	-----	1.0	2,3,7,8-TCDD-13C	2.00	78
				1,2,3,7,8-PeCDF-13C	2.00	71
2,3,7,8-TCDD	ND	-----	1.0	2,3,4,7,8-PeCDF-13C	2.00	69
Total TCDD	2.0	-----	1.0	1,2,3,7,8-PeCDD-13C	2.00	82
				1,2,3,4,7,8-HxCDF-13C	2.00	69
1,2,3,7,8-PeCDF	ND	-----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	72
2,3,4,7,8-PeCDF	12	-----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	69
Total PeCDF	300	-----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	70
				1,2,3,4,7,8-HxCDD-13C	2.00	72
1,2,3,7,8-PeCDD	ND	-----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	68
Total PeCDD	ND	-----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	68
				1,2,3,4,7,8,9-HpCDF-13C	2.00	66
1,2,3,4,7,8-HxCDF	7.3	-----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	81
1,2,3,6,7,8-HxCDF	ND	-----	5.0	OCDD-13C	4.00	49
2,3,4,6,7,8-HxCDF	7.0	-----	5.0			
1,2,3,7,8,9-HxCDF	ND	-----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	240	-----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	5.6	-----	5.0	2,3,7,8-TCDD-37Cl4	0.20	74
1,2,3,6,7,8-HxCDD	14	-----	5.0			
1,2,3,7,8,9-HxCDD	10	-----	5.0			
Total HxCDD	140	-----	5.0			
1,2,3,4,6,7,8-HpCDF	140	-----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	6.4	-----	5.0	Equivalence: 20 ng/Kg		
Total HpCDF	250	-----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	330	-----	5.0			
Total HpCDD	710	-----	5.0			
OCDF	220	-----	10			
OCDD	4000	-----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
RL = Reporting Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
C = Result obtained from confirmation analysis

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	O-01		
Lab Sample ID	10487441025		
Filename	F190831A_08		
Injected By	JRH		
Total Amount Extracted	11.0 g	Matrix	Solid
% Moisture	8.7	Dilution	NA
Dry Weight Extracted	10.1 g	Collected	08/13/2019 16:00
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 09:50

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	-----	1.0	2,3,7,8-TCDF-13C	2.00	66
Total TCDF	ND	-----	1.0	2,3,7,8-TCDD-13C	2.00	76
				1,2,3,7,8-PeCDF-13C	2.00	72
2,3,7,8-TCDD	ND	-----	1.0	2,3,4,7,8-PeCDF-13C	2.00	70
Total TCDD	ND	-----	1.0	1,2,3,7,8-PeCDD-13C	2.00	85
				1,2,3,4,7,8-HxCDF-13C	2.00	70
1,2,3,7,8-PeCDF	ND	-----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	68
2,3,4,7,8-PeCDF	ND	-----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	68
Total PeCDF	ND	-----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	59
				1,2,3,4,7,8-HxCDD-13C	2.00	77
1,2,3,7,8-PeCDD	ND	-----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	68
Total PeCDD	ND	-----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	72
				1,2,3,4,7,8,9-HpCDF-13C	2.00	73
1,2,3,4,7,8-HxCDF	ND	-----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	84
1,2,3,6,7,8-HxCDF	ND	-----	5.0	OCDD-13C	4.00	59
2,3,4,6,7,8-HxCDF	ND	-----	5.0			
1,2,3,7,8,9-HxCDF	ND	-----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	-----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	5.0	2,3,7,8-TCDD-37Cl4	0.20	75
1,2,3,6,7,8-HxCDD	ND	-----	5.0			
1,2,3,7,8,9-HxCDD	ND	-----	5.0			
Total HxCDD	ND	-----	5.0			
1,2,3,4,6,7,8-HpCDF	ND	-----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	5.0	Equivalence: 0.25 ng/Kg		
Total HpCDF	5.7	-----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	13	-----	5.0			
Total HpCDD	30	-----	5.0			
OCDF	13	-----	10			
OCDD	110	-----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

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**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	O-04		
Lab Sample ID	10487441026		
Filename	F190831A_09		
Injected By	JRH		
Total Amount Extracted	11.2 g	Matrix	Solid
% Moisture	10.0	Dilution	NA
Dry Weight Extracted	10.1 g	Collected	08/13/2019 16:15
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 10:36

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	60
Total TCDF	1.5	----	1.0	2,3,7,8-TCDD-13C	2.00	69
				1,2,3,7,8-PeCDF-13C	2.00	61
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	61
Total TCDD	ND	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	72
				1,2,3,4,7,8-HxCDF-13C	2.00	61
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	64
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	62
Total PeCDF	14	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	58
				1,2,3,4,7,8-HxCDD-13C	2.00	66
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	62
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	65
				1,2,3,4,7,8,9-HpCDF-13C	2.00	66
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	78
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	53
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	16	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	64
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	67	----	5.0			
1,2,3,4,6,7,8-HpCDF	19	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 1.8 ng/Kg		
Total HpCDF	52	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	99	----	5.0			
Total HpCDD	410	----	5.0			
OCDF	57	----	10			
OCDD	580	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

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**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441



**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	O-05		
Lab Sample ID	10487441027		
Filename	F190831A_10		
Injected By	JRH		
Total Amount Extracted	12.1 g	Matrix	Solid
% Moisture	13.2	Dilution	NA
Dry Weight Extracted	10.5 g	Collected	08/13/2019 16:25
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 11:22

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	60
Total TCDF	7.8	----	1.0	2,3,7,8-TCDD-13C	2.00	71
				1,2,3,7,8-PeCDF-13C	2.00	60
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	59
Total TCDD	1.2	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	73
				1,2,3,4,7,8-HxCDF-13C	2.00	79
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	72
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	69
Total PeCDF	41	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	59
				1,2,3,4,7,8-HxCDD-13C	2.00	76
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	57
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	53
				1,2,3,4,7,8,9-HpCDF-13C	2.00	47
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	59
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	31
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	57	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	64
1,2,3,6,7,8-HxCDD	7.7	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	84	----	5.0			
1,2,3,4,6,7,8-HpCDF	43	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 4.5 ng/Kg		
Total HpCDF	90	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	180	----	5.0			
Total HpCDD	400	----	5.0			
OCDF	95	----	10			
OCDD	1400	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit  
 ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	O-06		
Lab Sample ID	10487441028		
Filename	F190831A_11		
Injected By	JRH		
Total Amount Extracted	11.5 g	Matrix	Solid
% Moisture	11.8	Dilution	NA
Dry Weight Extracted	10.1 g	Collected	08/14/2019 07:30
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 12:08

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	-----	1.0	2,3,7,8-TCDF-13C	2.00	70
Total TCDF	3.5	-----	1.0	2,3,7,8-TCDD-13C	2.00	82
				1,2,3,7,8-PeCDF-13C	2.00	70
2,3,7,8-TCDD	ND	-----	1.0	2,3,4,7,8-PeCDF-13C	2.00	71
Total TCDD	ND	-----	1.0	1,2,3,7,8-PeCDD-13C	2.00	83
				1,2,3,4,7,8-HxCDF-13C	2.00	79
1,2,3,7,8-PeCDF	ND	-----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	82
2,3,4,7,8-PeCDF	ND	-----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	80
Total PeCDF	24	-----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	67
				1,2,3,4,7,8-HxCDD-13C	2.00	86
1,2,3,7,8-PeCDD	ND	-----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	75
Total PeCDD	ND	-----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	72
				1,2,3,4,7,8,9-HpCDF-13C	2.00	70
1,2,3,4,7,8-HxCDF	ND	-----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	86
1,2,3,6,7,8-HxCDF	ND	-----	5.0	OCDD-13C	4.00	54
2,3,4,6,7,8-HxCDF	ND	-----	5.0			
1,2,3,7,8,9-HxCDF	ND	-----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	38	-----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	5.0	2,3,7,8-TCDD-37Cl4	0.20	76
1,2,3,6,7,8-HxCDD	ND	-----	5.0			
1,2,3,7,8,9-HxCDD	ND	-----	5.0			
Total HxCDD	20	-----	5.0			
1,2,3,4,6,7,8-HpCDF	37	-----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	5.0	Equivalence: 1.9 ng/Kg		
Total HpCDF	80	-----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	83	-----	5.0			
Total HpCDD	160	-----	5.0			
OCDF	58	-----	10			
OCDD	680	-----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit  
 ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

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**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	O-08		
Lab Sample ID	10487441029		
Filename	F190831A_12		
Injected By	JRH		
Total Amount Extracted	11.3 g	Matrix	Solid
% Moisture	11.2	Dilution	NA
Dry Weight Extracted	10.0 g	Collected	08/14/2019 07:45
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 12:54

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	65
Total TCDF	1.1	----	1.0	2,3,7,8-TCDD-13C	2.00	78
				1,2,3,7,8-PeCDF-13C	2.00	67
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	67
Total TCDD	ND	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	79
				1,2,3,4,7,8-HxCDF-13C	2.00	75
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	69
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	67
Total PeCDF	6.8	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	55
				1,2,3,4,7,8-HxCDD-13C	2.00	78
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	66
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	73
				1,2,3,4,7,8,9-HpCDF-13C	2.00	70
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	86
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	54
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	7.3	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	72
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	12	----	5.0			
1,2,3,4,6,7,8-HpCDF	10	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 0.71 ng/Kg		
Total HpCDF	26	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	32	----	5.0			
Total HpCDD	75	----	5.0			
OCDF	22	----	10			
OCDD	270	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

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**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	O-07		
Lab Sample ID	10487441030		
Filename	F190831A_13		
Injected By	JRH		
Total Amount Extracted	11.3 g	Matrix	Solid
% Moisture	9.8	Dilution	NA
Dry Weight Extracted	10.2 g	Collected	08/14/2019 08:00
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-73004	Analyzed	08/31/2019 13:40

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	65
Total TCDF	ND	----	1.0	2,3,7,8-TCDD-13C	2.00	76
				1,2,3,7,8-PeCDF-13C	2.00	65
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	65
Total TCDD	ND	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	78
				1,2,3,4,7,8-HxCDF-13C	2.00	69
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	72
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	72
Total PeCDF	ND	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	69
				1,2,3,4,7,8-HxCDD-13C	2.00	73
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	70
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	75
				1,2,3,4,7,8,9-HpCDF-13C	2.00	75
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	88
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	58
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	71
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	ND	----	5.0			
1,2,3,4,6,7,8-HpCDF	ND	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 0.24 ng/Kg		
Total HpCDF	5.3	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	14	----	5.0			
Total HpCDD	25	----	5.0			
OCDF	ND	----	10			
OCDD	100	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

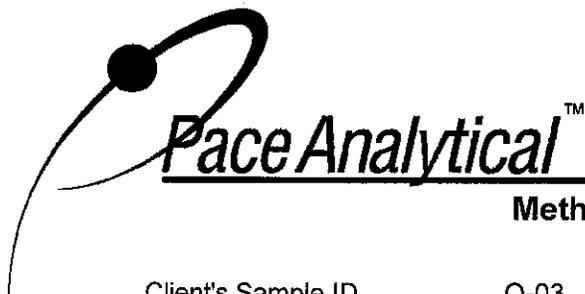
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**REPORT OF LABORATORY ANALYSIS**

Report No.....10487441

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**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	O-03		
Lab Sample ID	10487441031		
Filename	F190831A_14		
Injected By	JRH		
Total Amount Extracted	11.1 g	Matrix	Solid
% Moisture	8.8	Dilution	NA
Dry Weight Extracted	10.1 g	Collected	08/14/2019 08:15
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-73004	Analyzed	08/31/2019 14:26

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	68
Total TCDF	14	----	1.0	2,3,7,8-TCDD-13C	2.00	84
				1,2,3,7,8-PeCDF-13C	2.00	70
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	70
Total TCDD	3.0	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	83
				1,2,3,4,7,8-HxCDF-13C	2.00	71
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	78
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	69
Total PeCDF	64	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	75
				1,2,3,4,7,8-HxCDD-13C	2.00	80
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	71
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	82
				1,2,3,4,7,8,9-HpCDF-13C	2.00	80
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	100
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	63
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	23	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	78
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	21	----	5.0			
1,2,3,4,6,7,8-HpCDF	15	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 0.77 ng/Kg		
Total HpCDF	31	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	33	----	5.0			
Total HpCDD	79	----	5.0			
OCDF	25	----	10			
OCDD	260	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit  
 ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

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**REPORT OF LABORATORY ANALYSIS**

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**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	O-02		
Lab Sample ID	10487441032		
Filename	F190831A_15		
Injected By	JRH		
Total Amount Extracted	12.0 g	Matrix	Solid
% Moisture	11.1	Dilution	NA
Dry Weight Extracted	10.7 g	Collected	08/14/2019 08:25
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-73004	Analyzed	08/31/2019 15:12

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	66
Total TCDF	1.0	----	1.0	2,3,7,8-TCDD-13C	2.00	79
				1,2,3,7,8-PeCDF-13C	2.00	65
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	64
Total TCDD	ND	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	76
				1,2,3,4,7,8-HxCDF-13C	2.00	72
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	76
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	71
Total PeCDF	12	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	69
				1,2,3,4,7,8-HxCDD-13C	2.00	74
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	74
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	76
				1,2,3,4,7,8,9-HpCDF-13C	2.00	78
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	93
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	61
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	5.8	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	72
1,2,3,6,7,8-HxCDD	ND	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	ND	----	5.0			
1,2,3,4,6,7,8-HpCDF	9.6	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 0.49 ng/Kg		
Total HpCDF	19	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	22	----	5.0			
Total HpCDD	50	----	5.0			
OCDF	17	----	10			
OCDD	160	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

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**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441

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**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N4-3		
Lab Sample ID	10487441033		
Filename	Y190830B_11		
Injected By	JRH		
Total Amount Extracted	11.2 g	Matrix	Solid
% Moisture	8.9	Dilution	NA
Dry Weight Extracted	10.2 g	Collected	08/14/2019 09:00
ICAL ID	Y190827	Received	08/15/2019 08:40
CCal Filename(s)	Y190830A_18	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-73004	Analyzed	08/31/2019 06:12

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	2.4	----	1.0 V	2,3,7,8-TCDF-13C	2.00	63
Total TCDF	140	----	1.0	2,3,7,8-TCDD-13C	2.00	66
				1,2,3,7,8-PeCDF-13C	2.00	70
2,3,7,8-TCDD	1.0	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	70
Total TCDD	12	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	76
				1,2,3,4,7,8-HxCDF-13C	2.00	88 DN2
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	83 DN2
2,3,4,7,8-PeCDF	61	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	81 DN2
Total PeCDF	750	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	41 DN2
				1,2,3,4,7,8-HxCDD-13C	2.00	90 DN2
1,2,3,7,8-PeCDD	5.9	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	74 DN2
Total PeCDD	18	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	70 DN2
				1,2,3,4,7,8,9-HpCDF-13C	2.00	79 DN2
1,2,3,4,7,8-HxCDF	----	75	5.0 PDN2	1,2,3,4,6,7,8-HpCDD-13C	2.00	81 DN2
1,2,3,6,7,8-HxCDF	----	28	5.0 PDN2	OCDD-13C	4.00	84 DN2
2,3,4,6,7,8-HxCDF	30	----	5.0 DN2			
1,2,3,7,8,9-HxCDF	6.1	----	5.0 JDN2	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	1200	----	5.0 DN2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	9.0	----	5.0 JDN2	2,3,7,8-TCDD-37Cl4	0.20	77
1,2,3,6,7,8-HxCDD	44	----	5.0 DN2			
1,2,3,7,8,9-HxCDD	15	----	5.0 JDN2			
Total HxCDD	310	----	5.0 DN2			
1,2,3,4,6,7,8-HpCDF	380	----	5.0 DN2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	20	----	5.0 JDN2	Equivalence: 78 ng/Kg		
Total HpCDF	1100	----	5.0 DN2	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	930	----	5.0 DN2			
Total HpCDD	1900	----	5.0 DN2			
OCDF	620	----	10 DN2			
OCDD	9200	----	10 DN2			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 RL = Reporting Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

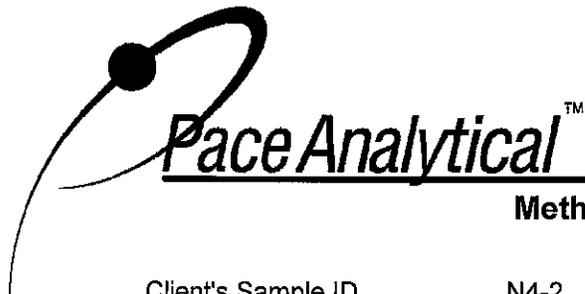
Results reported on a dry weight basis and are valid to no more than 2 significant figures.

J = Estimated value  
 P = PCDE Interference  
 D = Result obtained from analysis of diluted sample  
 Nn = Value obtained from additional analysis  
 V = Result verified by confirmation analysis

**REPORT OF LABORATORY ANALYSIS**

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Report No.....10487441



**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N4-2			
Lab Sample ID	10487441034			
Filename	Y190830B_12			
Injected By	JRH			
Total Amount Extracted	11.5 g	Matrix	Solid	
% Moisture	12.0	Dilution	NA	
Dry Weight Extracted	10.1 g	Collected	08/14/2019 09:15	
ICAL ID	Y190827	Received	08/15/2019 08:40	
CCal Filename(s)	Y190830A_18	Extracted	08/28/2019 15:05	
Method Blank ID	BLANK-73004	Analyzed	08/31/2019 06:58	

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	4.4	-----	1.0 C	2,3,7,8-TCDF-13C	2.00	81
Total TCDF	98	-----	1.0	2,3,7,8-TCDD-13C	2.00	87
				1,2,3,7,8-PeCDF-13C	2.00	89
2,3,7,8-TCDD	ND	-----	1.0	2,3,4,7,8-PeCDF-13C	2.00	99
Total TCDD	17	-----	1.0	1,2,3,7,8-PeCDD-13C	2.00	104
				1,2,3,4,7,8-HxCDF-13C	2.00	89 DN2
1,2,3,7,8-PeCDF	-----	270	5.0 P	1,2,3,6,7,8-HxCDF-13C	2.00	80 DN2
2,3,4,7,8-PeCDF	14	-----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	84 DN2
Total PeCDF	480	-----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	46 DN2
				1,2,3,4,7,8-HxCDD-13C	2.00	86 DN2
1,2,3,7,8-PeCDD	5.2	-----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	68 DN2
Total PeCDD	11	-----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	64 DN2
				1,2,3,4,7,8,9-HpCDF-13C	2.00	70 DN2
1,2,3,4,7,8-HxCDF	16	-----	5.0 JDN2	1,2,3,4,6,7,8-HpCDD-13C	2.00	70 DN2
1,2,3,6,7,8-HxCDF	20	-----	5.0 JDN2	OCDD-13C	4.00	74 DN2
2,3,4,6,7,8-HxCDF	16	-----	5.0 JDN2			
1,2,3,7,8,9-HxCDF	6.7	-----	5.0 JDN2	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	430	-----	5.0 DN2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	7.8	-----	5.0 JDN2	2,3,7,8-TCDD-37Cl4	0.20	101
1,2,3,6,7,8-HxCDD	39	-----	5.0 DN2			
1,2,3,7,8,9-HxCDD	15	-----	5.0 JDN2			
Total HxCDD	260	-----	5.0 DN2			
1,2,3,4,6,7,8-HpCDF	250	-----	5.0 DN2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	14	-----	5.0 JDN2	Equivalence: 54 ng/Kg		
Total HpCDF	610	-----	5.0 DN2	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	820	-----	5.0 DN2			
Total HpCDD	1600	-----	5.0 DN2			
OCDF	490	-----	10 DN2			
OCDD	7300	-----	10 DN2			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers). ND = Not Detected  
 EMPC = Estimated Maximum Possible Concentration NA = Not Applicable  
 RL = Reporting Limit NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
 J = Estimated value  
 P = PCDE interference  
 D = Result obtained from analysis of diluted sample  
 Nn = Value obtained from additional analysis  
 C = Result obtained from confirmation analysis

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**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N4-1		
Lab Sample ID	10487441035		
Filename	Y190830B_13		
Injected By	JRH		
Total Amount Extracted	11.5 g	Matrix	Solid
% Moisture	8.7	Dilution	NA
Dry Weight Extracted	10.5 g	Collected	08/14/2019 09:25
ICAL ID	Y190827	Received	08/15/2019 08:40
CCal Filename(s)	Y190830A_18	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-73004	Analyzed	08/31/2019 07:43

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	2.1	----	1.0 V	2,3,7,8-TCDF-13C	2.00	84
Total TCDF	58	----	1.0	2,3,7,8-TCDD-13C	2.00	82
				1,2,3,7,8-PeCDF-13C	2.00	84
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	85
Total TCDD	7.4	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	92
				1,2,3,4,7,8-HxCDF-13C	2.00	97
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	93
2,3,4,7,8-PeCDF	11	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	90
Total PeCDF	170	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	61
				1,2,3,4,7,8-HxCDD-13C	2.00	86
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	71
Total PeCDD	12	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	52
				1,2,3,4,7,8,9-HpCDF-13C	2.00	43
1,2,3,4,7,8-HxCDF	8.2	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	48
1,2,3,6,7,8-HxCDF	8.0	----	5.0	OCDD-13C	4.00	28
2,3,4,6,7,8-HxCDF	6.5	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	190	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	6.3	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	80
1,2,3,6,7,8-HxCDD	24	----	5.0			
1,2,3,7,8,9-HxCDD	12	----	5.0			
Total HxCDD	170	----	5.0			
1,2,3,4,6,7,8-HpCDF	150	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	9.4	----	5.0	Equivalence: 25 ng/Kg		
Total HpCDF	380	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	530	----	5.0			
Total HpCDD	1000	----	5.0			
OCDF	320	----	10			
OCDD	5100	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
RL = Reporting Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
V = Result verified by confirmation analysis

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**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N7-1		
Lab Sample ID	10487441036		
Filename	Y190830B_14		
Injected By	JRH		
Total Amount Extracted	11.1 g	Matrix	Solid
% Moisture	8.2	Dilution	NA
Dry Weight Extracted	10.2 g	Collected	08/14/2019 08:45
ICAL ID	Y190827	Received	08/15/2019 08:40
CCal Filename(s)	Y190830A_18	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-73004	Analyzed	08/31/2019 08:29

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	1.0	2,3,7,8-TCDF-13C	2.00	83
Total TCDF	17	----	1.0	2,3,7,8-TCDD-13C	2.00	81
				1,2,3,7,8-PeCDF-13C	2.00	83
2,3,7,8-TCDD	ND	----	1.0	2,3,4,7,8-PeCDF-13C	2.00	85
Total TCDD	ND	----	1.0	1,2,3,7,8-PeCDD-13C	2.00	88
				1,2,3,4,7,8-HxCDF-13C	2.00	84
1,2,3,7,8-PeCDF	ND	----	5.0	1,2,3,6,7,8-HxCDF-13C	2.00	77
2,3,4,7,8-PeCDF	ND	----	5.0	2,3,4,6,7,8-HxCDF-13C	2.00	80
Total PeCDF	38	----	5.0	1,2,3,7,8,9-HxCDF-13C	2.00	50
				1,2,3,4,7,8-HxCDD-13C	2.00	82
1,2,3,7,8-PeCDD	ND	----	5.0	1,2,3,6,7,8-HxCDD-13C	2.00	68
Total PeCDD	ND	----	5.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	63
				1,2,3,4,7,8,9-HpCDF-13C	2.00	59
1,2,3,4,7,8-HxCDF	ND	----	5.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	58
1,2,3,6,7,8-HxCDF	ND	----	5.0	OCDD-13C	4.00	36
2,3,4,6,7,8-HxCDF	ND	----	5.0			
1,2,3,7,8,9-HxCDF	ND	----	5.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	75	----	5.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	5.0	2,3,7,8-TCDD-37Cl4	0.20	82
1,2,3,6,7,8-HxCDD	6.1	----	5.0			
1,2,3,7,8,9-HxCDD	ND	----	5.0			
Total HxCDD	40	----	5.0			
1,2,3,4,6,7,8-HpCDF	46	----	5.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	5.0	Equivalence: 4.0 ng/Kg		
Total HpCDF	100	----	5.0	(Lower-bound - Using ITE Factors)		
1,2,3,4,6,7,8-HpCDD	150	----	5.0			
Total HpCDD	330	----	5.0			
OCDF	71	----	10			
OCDD	1300	----	10			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
RL = Reporting Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

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## Reporting Flags

- A = Reporting Limit based on signal to noise
- B = Less than 10x higher than method blank level
- C = Result obtained from confirmation analysis
- D = Result obtained from analysis of diluted sample
- E = Exceeds calibration range
- I = Interference present
- J = Estimated value
- L = Suppressive interference, analyte may be biased low
- Nn = Value obtained from additional analysis
- P = PCDE Interference
- R = Recovery outside target range
- S = Peak saturated
- U = Analyte not detected
- V = Result verified by confirmation analysis
- X = %D Exceeds limits
- Y = Calculated using average of daily RFs
- \* = See Discussion

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## **Appendix B**

### Sample Analysis Summary



### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N6-1				
Lab Sample ID	10487441001				
Filename	U190830B_03				
Injected By	SMT				
Total Amount Extracted	12.8 g	Matrix	Solid		
% Moisture	9.3	Dilution	NA		
Dry Weight Extracted	11.6 g	Collected	08/13/2019 08:00		
ICAL ID	U190730	Received	08/15/2019 08:40		
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05		
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 11:41		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.35	2,3,7,8-TCDF-13C	2.00	91
Total TCDF	1.9	----	0.35	2,3,7,8-TCDD-13C	2.00	91
				1,2,3,7,8-PeCDF-13C	2.00	94
2,3,7,8-TCDD	ND	----	0.54	2,3,4,7,8-PeCDF-13C	2.00	92
Total TCDD	ND	----	0.54	1,2,3,7,8-PeCDD-13C	2.00	102
				1,2,3,4,7,8-HxCDF-13C	2.00	80 DN2
1,2,3,7,8-PeCDF	ND	----	0.45	1,2,3,6,7,8-HxCDF-13C	2.00	74 DN2
2,3,4,7,8-PeCDF	0.80	----	0.34 J	2,3,4,6,7,8-HxCDF-13C	2.00	71 DN2
Total PeCDF	9.8	----	0.34	1,2,3,7,8,9-HxCDF-13C	2.00	57 DN2
				1,2,3,4,7,8-HxCDD-13C	2.00	84 DN2
1,2,3,7,8-PeCDD	0.60	----	0.42 J	1,2,3,6,7,8-HxCDD-13C	2.00	67 DN2
Total PeCDD	1.3	----	0.42 J	1,2,3,4,6,7,8-HpCDF-13C	2.00	63 DN2
				1,2,3,4,7,8,9-HpCDF-13C	2.00	64 DN2
1,2,3,4,7,8-HxCDF	0.57	----	0.30 JDN2	1,2,3,4,6,7,8-HpCDD-13C	2.00	68 DN2
1,2,3,6,7,8-HxCDF	0.79	----	0.32 JDN2	OCDD-13C	4.00	48 DN2
2,3,4,6,7,8-HxCDF	----	0.31	0.27 IJDN2			
1,2,3,7,8,9-HxCDF	0.41	----	0.13 JDN2	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	13	----	0.13 JDN2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	0.77	----	0.29 BJDN2	2,3,7,8-TCDD-37Cl4	0.20	87
1,2,3,6,7,8-HxCDD	1.5	----	0.31 JDN2			
1,2,3,7,8,9-HxCDD	----	1.3	0.38 IJDN2			
Total HxCDD	6.8	----	0.29 JDN2			
1,2,3,4,6,7,8-HpCDF	7.0	----	0.40 JDN2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	0.35 DN2	Equivalence: 1.7 ng/Kg		
Total HpCDF	15	----	0.35 JDN2	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	19	----	0.43 JDN2			
Total HpCDD	39	----	0.43 DN2			
OCDF	11	----	0.73 JDN2			
OCDD	160	----	0.85 DN2			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

J = Estimated value  
B = Less than 10x higher than method blank level  
I = Interference present  
D = Result obtained from analysis of diluted sample  
Nn = Value obtained from additional analysis

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**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N6-2				
Lab Sample ID	10487441002				
Filename	U190830B_04				
Injected By	SMT				
Total Amount Extracted	11.8 g	Matrix	Solid		
% Moisture	11.4	Dilution	NA		
Dry Weight Extracted	10.5 g	Collected	08/13/2019 08:16		
ICAL ID	U190730	Received	08/15/2019 08:40		
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05		
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 12:24		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.68	2,3,7,8-TCDF-13C	2.00	81
Total TCDF	19	----	0.68	2,3,7,8-TCDD-13C	2.00	83
				1,2,3,7,8-PeCDF-13C	2.00	85
2,3,7,8-TCDD	ND	----	0.77	2,3,4,7,8-PeCDF-13C	2.00	85
Total TCDD	1.7	----	0.77	1,2,3,7,8-PeCDD-13C	2.00	92
				1,2,3,4,7,8-HxCDF-13C	2.00	90 DN2
1,2,3,7,8-PeCDF	ND	----	0.53	1,2,3,6,7,8-HxCDF-13C	2.00	84 DN2
2,3,4,7,8-PeCDF	5.0	----	0.42	2,3,4,6,7,8-HxCDF-13C	2.00	82 DN2
Total PeCDF	58	----	0.42	1,2,3,7,8,9-HxCDF-13C	2.00	42 DN2
				1,2,3,4,7,8-HxCDD-13C	2.00	98 DN2
1,2,3,7,8-PeCDD	1.2	----	0.60 J	1,2,3,6,7,8-HxCDD-13C	2.00	77 DN2
Total PeCDD	3.9	----	0.60 J	1,2,3,4,6,7,8-HpCDF-13C	2.00	75 DN2
				1,2,3,4,7,8,9-HpCDF-13C	2.00	77 DN2
1,2,3,4,7,8-HxCDF	2.8	----	0.32 JDN2	1,2,3,4,6,7,8-HpCDD-13C	2.00	79 DN2
1,2,3,6,7,8-HxCDF	2.2	----	0.34 JDN2	OCDD-13C	4.00	68 DN2
2,3,4,6,7,8-HxCDF	2.5	----	0.35 JDN2			
1,2,3,7,8,9-HxCDF	----	0.57	0.15 IJDN2	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	69	----	0.15 DN2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.7	----	0.57 JDN2	2,3,7,8-TCDD-37Cl4	0.20	78
1,2,3,6,7,8-HxCDD	5.1	----	0.66 JDN2			
1,2,3,7,8,9-HxCDD	1.9	----	0.52 JDN2			
Total HxCDD	39	----	0.52 DN2			
1,2,3,4,6,7,8-HpCDF	34	----	0.41 DN2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	1.5	----	0.40 JDN2	Equivalence: 6.0 ng/Kg		
Total HpCDF	90	----	0.40 DN2	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	96	----	0.41 DN2			
Total HpCDD	200	----	0.41 DN2			
OCDF	73	----	1.0 DN2			
OCDD	860	----	0.84 DN2			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

J = Estimated value  
 I = Interference present  
 D = Result obtained from analysis of diluted sample  
 Nn = Value obtained from additional analysis

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N6-4				
Lab Sample ID	10487441003				
Filename	U190830B_05				
Injected By	SMT				
Total Amount Extracted	11.4 g	Matrix	Solid		
% Moisture	11.9	Dilution	NA		
Dry Weight Extracted	10.0 g	Collected	08/13/2019 08:40		
ICAL ID	U190730	Received	08/15/2019 08:40		
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05		
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 13:08		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.56	----	0.36	J	2,3,7,8-TCDF-13C	2.00	83
Total TCDF	26	----	0.36		2,3,7,8-TCDD-13C	2.00	84
					1,2,3,7,8-PeCDF-13C	2.00	84
2,3,7,8-TCDD	ND	----	0.44		2,3,4,7,8-PeCDF-13C	2.00	84
Total TCDD	3.1	----	0.44		1,2,3,7,8-PeCDD-13C	2.00	92
					1,2,3,4,7,8-HxCDF-13C	2.00	74 DN2
1,2,3,7,8-PeCDF	0.65	----	0.42	J	1,2,3,6,7,8-HxCDF-13C	2.00	66 DN2
2,3,4,7,8-PeCDF	1.9	----	0.48	J	2,3,4,6,7,8-HxCDF-13C	2.00	66 DN2
Total PeCDF	51	----	0.42		1,2,3,7,8,9-HxCDF-13C	2.00	52 DN2
					1,2,3,4,7,8-HxCDD-13C	2.00	79 DN2
1,2,3,7,8-PeCDD	----	0.47	0.40	IJ	1,2,3,6,7,8-HxCDD-13C	2.00	61 DN2
Total PeCDD	2.6	----	0.40	J	1,2,3,4,6,7,8-HpCDF-13C	2.00	61 DN2
					1,2,3,4,7,8,9-HpCDF-13C	2.00	64 DN2
1,2,3,4,7,8-HxCDF	1.4	----	0.44	JDN2	1,2,3,4,6,7,8-HpCDD-13C	2.00	67 DN2
1,2,3,6,7,8-HxCDF	2.0	----	0.31	JDN2	OCDD-13C	4.00	51 DN2
2,3,4,6,7,8-HxCDF	1.7	----	0.16	JDN2			
1,2,3,7,8,9-HxCDF	0.69	----	0.16	JDN2	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	43	----	0.16	DN2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	0.73	----	0.50	BJDN2	2,3,7,8-TCDD-37Cl4	0.20	76
1,2,3,6,7,8-HxCDD	2.4	----	0.51	JDN2			
1,2,3,7,8,9-HxCDD	1.6	----	0.25	JDN2			
Total HxCDD	21	----	0.25	JDN2			
1,2,3,4,6,7,8-HpCDF	17	----	0.37	JDN2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	----	0.98	0.39	IJDN2	Equivalence: 2.8 ng/Kg		
Total HpCDF	43	----	0.37	DN2	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	39	----	0.90	DN2			
Total HpCDD	78	----	0.90	DN2			
OCDF	40	----	0.76	JDN2			
OCDD	310	----	0.46	DN2			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

J = Estimated value  
 B = Less than 10x higher than method blank level  
 I = Interference present  
 D = Result obtained from analysis of diluted sample  
 Nn = Value obtained from additional analysis

## REPORT OF LABORATORY ANALYSIS

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N6-3				
Lab Sample ID	10487441004				
Filename	U190830B_06				
Injected By	SMT				
Total Amount Extracted	11.6 g	Matrix	Solid		
% Moisture	10.2	Dilution	NA		
Dry Weight Extracted	10.4 g	Collected	08/13/2019 09:00		
ICAL ID	U190730	Received	08/15/2019 08:40		
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05		
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 13:51		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.53		2,3,7,8-TCDF-13C	2.00	79
Total TCDF	2.5	----	0.53		2,3,7,8-TCDD-13C	2.00	78
					1,2,3,7,8-PeCDF-13C	2.00	76
2,3,7,8-TCDD	ND	----	0.39		2,3,4,7,8-PeCDF-13C	2.00	79
Total TCDD	0.73	----	0.39	J	1,2,3,7,8-PeCDD-13C	2.00	83
					1,2,3,4,7,8-HxCDF-13C	2.00	81
1,2,3,7,8-PeCDF	ND	----	0.60		1,2,3,6,7,8-HxCDF-13C	2.00	70
2,3,4,7,8-PeCDF	----	0.46	0.43	U	2,3,4,6,7,8-HxCDF-13C	2.00	75
Total PeCDF	7.3	----	0.43		1,2,3,7,8,9-HxCDF-13C	2.00	45
					1,2,3,4,7,8-HxCDD-13C	2.00	79
1,2,3,7,8-PeCDD	0.51	----	0.37	J	1,2,3,6,7,8-HxCDD-13C	2.00	61
Total PeCDD	2.1	----	0.37	J	1,2,3,4,6,7,8-HpCDF-13C	2.00	64
					1,2,3,4,7,8,9-HpCDF-13C	2.00	71
1,2,3,4,7,8-HxCDF	----	0.71	0.39	U	1,2,3,4,6,7,8-HpCDD-13C	2.00	71
1,2,3,6,7,8-HxCDF	----	0.82	0.33	U	OCDD-13C	4.00	58
2,3,4,6,7,8-HxCDF	----	0.53	0.27	U			
1,2,3,7,8,9-HxCDF	ND	----	0.38		1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	15	----	0.27		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	0.80	----	0.27	BJ	2,3,7,8-TCDD-37Cl4	0.20	80
1,2,3,6,7,8-HxCDD	----	2.0	0.36	U			
1,2,3,7,8,9-HxCDD	----	1.6	0.29	U			
Total HxCDD	14	----	0.27				
1,2,3,4,6,7,8-HpCDF	12	----	0.27		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	----	0.81	0.34	U	Equivalence: 2.1 ng/Kg		
Total HpCDF	33	----	0.27		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	51	----	0.48				
Total HpCDD	91	----	0.48				
OCDF	43	----	0.41				
OCDD	460	----	0.45				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
J = Estimated value  
B = Less than 10x higher than method blank level  
I = Interference present

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N2-1				
Lab Sample ID	10487441005				
Filename	U190830B_07				
Injected By	SMT				
Total Amount Extracted	12.1 g	Matrix	Solid		
% Moisture	17.6	Dilution	NA		
Dry Weight Extracted	10.0 g	Collected	08/13/2019 09:35		
ICAL ID	U190730	Received	08/15/2019 08:40		
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05		
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 14:35		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.55	----	0.21	J	2,3,7,8-TCDF-13C	2.00	87
Total TCDF	16	----	0.21		2,3,7,8-TCDD-13C	2.00	87
					1,2,3,7,8-PeCDF-13C	2.00	88
2,3,7,8-TCDD	ND	----	0.24		2,3,4,7,8-PeCDF-13C	2.00	91
Total TCDD	3.3	----	0.24		1,2,3,7,8-PeCDD-13C	2.00	92
					1,2,3,4,7,8-HxCDF-13C	2.00	81
1,2,3,7,8-PeCDF	0.60	----	0.37	J	1,2,3,6,7,8-HxCDF-13C	2.00	77
2,3,4,7,8-PeCDF	----	1.6	0.39	U	2,3,4,6,7,8-HxCDF-13C	2.00	79
Total PeCDF	33	----	0.37		1,2,3,7,8,9-HxCDF-13C	2.00	57
					1,2,3,4,7,8-HxCDD-13C	2.00	87
1,2,3,7,8-PeCDD	0.82	----	0.35	J	1,2,3,6,7,8-HxCDD-13C	2.00	65
Total PeCDD	7.5	----	0.35		1,2,3,4,6,7,8-HpCDF-13C	2.00	70
					1,2,3,4,7,8,9-HpCDF-13C	2.00	79
1,2,3,4,7,8-HxCDF	----	0.91	0.51	U	1,2,3,4,6,7,8-HpCDD-13C	2.00	83
1,2,3,6,7,8-HxCDF	1.2	----	0.48	J	OCDD-13C	4.00	64
2,3,4,6,7,8-HxCDF	1.0	----	0.44	J			
1,2,3,7,8,9-HxCDF	----	0.49	0.28	U	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	23	----	0.28		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	0.92	----	0.34	BJ	2,3,7,8-TCDD-37Cl4	0.20	79
1,2,3,6,7,8-HxCDD	2.0	----	0.23	J			
1,2,3,7,8,9-HxCDD	1.6	----	0.21	J			
Total HxCDD	20	----	0.21				
1,2,3,4,6,7,8-HpCDF	13	----	0.21		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	----	0.54	0.18	U	Equivalence: 2.7 ng/Kg		
Total HpCDF	27	----	0.18		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	34	----	0.31				
Total HpCDD	63	----	0.31				
OCDF	18	----	0.49				
OCDD	250	----	0.59				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
J = Estimated value  
B = Less than 10x higher than method blank level  
I = Interference present

## REPORT OF LABORATORY ANALYSIS

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N2-2				
Lab Sample ID	10487441006				
Filename	U190830B_08				
Injected By	SMT				
Total Amount Extracted	11.7 g	Matrix	Solid		
% Moisture	14.4	Dilution	NA		
Dry Weight Extracted	10.00 g	Collected	08/13/2019 09:45		
ICAL ID	U190730	Received	08/15/2019 08:40		
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05		
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 15:18		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.97	----	0.34	J	2,3,7,8-TCDF-13C	2.00	67
Total TCDF	46	----	0.34		2,3,7,8-TCDD-13C	2.00	67
					1,2,3,7,8-PeCDF-13C	2.00	68
2,3,7,8-TCDD	ND	----	0.36		2,3,4,7,8-PeCDF-13C	2.00	72
Total TCDD	3.5	----	0.36		1,2,3,7,8-PeCDD-13C	2.00	74
					1,2,3,4,7,8-HxCDF-13C	2.00	66
1,2,3,7,8-PeCDF	2.0	----	0.44	J	1,2,3,6,7,8-HxCDF-13C	2.00	56
2,3,4,7,8-PeCDF	6.8	----	0.30		2,3,4,6,7,8-HxCDF-13C	2.00	60
Total PeCDF	140	----	0.30		1,2,3,7,8,9-HxCDF-13C	2.00	48
					1,2,3,4,7,8-HxCDD-13C	2.00	71
1,2,3,7,8-PeCDD	3.0	----	0.52	J	1,2,3,6,7,8-HxCDD-13C	2.00	45
Total PeCDD	23	----	0.52		1,2,3,4,6,7,8-HpCDF-13C	2.00	55
					1,2,3,4,7,8,9-HpCDF-13C	2.00	67
1,2,3,4,7,8-HxCDF	12	----	0.41		1,2,3,4,6,7,8-HpCDD-13C	2.00	68
1,2,3,6,7,8-HxCDF	----	9.1	0.40	P	OCDD-13C	4.00	63
2,3,4,6,7,8-HxCDF	5.6	----	0.53				
1,2,3,7,8,9-HxCDF	4.8	----	0.35	J	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	230	----	0.35		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	7.2	----	0.41		2,3,7,8-TCDD-37Cl4	0.20	63
1,2,3,6,7,8-HxCDD	22	----	0.53				
1,2,3,7,8,9-HxCDD	13	----	0.55				
Total HxCDD	130	----	0.41				
1,2,3,4,6,7,8-HpCDF	160	----	0.98		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	11	----	0.35		Equivalence: 19 ng/Kg		
Total HpCDF	420	----	0.35		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	400	----	0.46				
Total HpCDD	670	----	0.46				
OCDF	310	----	0.40				
OCDD	3000	----	0.36				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
 J = Estimated value  
 P = PCDE Interference

## REPORT OF LABORATORY ANALYSIS

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N2-4				
Lab Sample ID	10487441007				
Filename	U190830B_09				
Injected By	SMT				
Total Amount Extracted	12.0 g	Matrix		Solid	
% Moisture	14.9	Dilution		NA	
Dry Weight Extracted	10.2 g	Collected		08/13/2019 10:05	
ICAL ID	U190730	Received		08/15/2019 08:40	
CCal Filename(s)	U190830B_01	Extracted		08/27/2019 15:05	
Method Blank ID	BLANK-72962	Analyzed		08/30/2019 16:01	

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	1.8	----	0.43	C	2,3,7,8-TCDF-13C	2.00	83
Total TCDF	56	----	0.53		2,3,7,8-TCDD-13C	2.00	84
					1,2,3,7,8-PeCDF-13C	2.00	89
2,3,7,8-TCDD	ND	----	0.32		2,3,4,7,8-PeCDF-13C	2.00	76
Total TCDD	2.7	----	0.32		1,2,3,7,8-PeCDD-13C	2.00	84
					1,2,3,4,7,8-HxCDF-13C	2.00	128
1,2,3,7,8-PeCDF	1.9	----	1.0	J	1,2,3,6,7,8-HxCDF-13C	2.00	113
2,3,4,7,8-PeCDF	13	----	0.48		2,3,4,6,7,8-HxCDF-13C	2.00	119
Total PeCDF	160	----	0.48		1,2,3,7,8,9-HxCDF-13C	2.00	120
					1,2,3,4,7,8-HxCDD-13C	2.00	137
1,2,3,7,8-PeCDD	2.5	----	0.32	J	1,2,3,6,7,8-HxCDD-13C	2.00	102
Total PeCDD	11	----	0.32		1,2,3,4,6,7,8-HpCDF-13C	2.00	111
					1,2,3,4,7,8,9-HpCDF-13C	2.00	126
1,2,3,4,7,8-HxCDF	6.1	----	0.24		1,2,3,4,6,7,8-HpCDD-13C	2.00	137
1,2,3,6,7,8-HxCDF	6.0	----	0.21		OCDD-13C	4.00	129
2,3,4,6,7,8-HxCDF	6.1	----	0.25				
1,2,3,7,8,9-HxCDF	1.9	----	0.30	J	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	150	----	0.21		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	3.4	----	0.31	J	2,3,7,8-TCDD-37Cl4	0.20	75
1,2,3,6,7,8-HxCDD	11	----	0.16				
1,2,3,7,8,9-HxCDD	4.1	----	0.17	J			
Total HxCDD	71	----	0.16				
1,2,3,4,6,7,8-HpCDF	94	----	0.17		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	----	3.5	0.29	U	Equivalence: 14 ng/Kg		
Total HpCDF	210	----	0.17		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	210	----	0.33				
Total HpCDD	350	----	0.33				
OCDF	130	----	0.25				
OCDD	1600	----	0.27				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
 J = Estimated value  
 I = Interference present  
 C = Result obtained from confirmation analysis

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**Method 1613B Sample Analysis Results**

Client - TRC-WI

Client's Sample ID	N2-3				
Lab Sample ID	10487441008				
Filename	U190830B_10				
Injected By	SMT				
Total Amount Extracted	11.6 g	Matrix	Solid		
% Moisture	13.2	Dilution	NA		
Dry Weight Extracted	10.0 g	Collected	08/13/2019 10:15		
ICAL ID	U190730	Received	08/15/2019 08:40		
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05		
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 16:44		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.79	----	0.43	J	2,3,7,8-TCDF-13C	2.00	82
Total TCDF	39	----	0.43		2,3,7,8-TCDD-13C	2.00	82
					1,2,3,7,8-PeCDF-13C	2.00	83
2,3,7,8-TCDD	16	----	0.66		2,3,4,7,8-PeCDF-13C	2.00	84
Total TCDD	19	----	0.66		1,2,3,7,8-PeCDD-13C	2.00	87
					1,2,3,4,7,8-HxCDF-13C	2.00	79
1,2,3,7,8-PeCDF	1.0	----	0.51	J	1,2,3,6,7,8-HxCDF-13C	2.00	66
2,3,4,7,8-PeCDF	5.7	----	0.40		2,3,4,6,7,8-HxCDF-13C	2.00	68
Total PeCDF	110	----	0.40		1,2,3,7,8,9-HxCDF-13C	2.00	49
					1,2,3,4,7,8-HxCDD-13C	2.00	76
1,2,3,7,8-PeCDD	0.79	----	0.33	J	1,2,3,6,7,8-HxCDD-13C	2.00	59
Total PeCDD	9.0	----	0.33		1,2,3,4,6,7,8-HpCDF-13C	2.00	64
					1,2,3,4,7,8,9-HpCDF-13C	2.00	78
1,2,3,4,7,8-HxCDF	1.9	----	0.41	J	1,2,3,4,6,7,8-HpCDD-13C	2.00	74
1,2,3,6,7,8-HxCDF	3.0	----	0.46	J	OCDD-13C	4.00	68
2,3,4,6,7,8-HxCDF	3.0	----	0.44	J			
1,2,3,7,8,9-HxCDF	0.83	----	0.54	J	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	77	----	0.41		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.8	----	0.38	J	2,3,7,8-TCDD-37Cl4	0.20	74
1,2,3,6,7,8-HxCDD	3.8	----	0.38	J			
1,2,3,7,8,9-HxCDD	3.3	----	0.41	J			
Total HxCDD	36	----	0.38				
1,2,3,4,6,7,8-HpCDF	32	----	0.43		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	1.8	----	0.40	J	Equivalence: 21 ng/Kg		
Total HpCDF	71	----	0.40		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	72	----	0.27				
Total HpCDD	130	----	0.27				
OCDF	59	----	0.28				
OCDD	520	----	0.40				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
J = Estimated value

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N2-5				
Lab Sample ID	10487441009				
Filename	U190830B_11				
Injected By	SMT				
Total Amount Extracted	12.0 g	Matrix	Solid		
% Moisture	14.6	Dilution	NA		
Dry Weight Extracted	10.2 g	Collected	08/13/2019 10:30		
ICAL ID	U190730	Received	08/15/2019 08:40		
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05		
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 17:28		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.67	----	0.48	J	2,3,7,8-TCDF-13C	2.00	85
Total TCDF	10	----	0.48		2,3,7,8-TCDD-13C	2.00	84
					1,2,3,7,8-PeCDF-13C	2.00	87
2,3,7,8-TCDD	ND	----	0.37		2,3,4,7,8-PeCDF-13C	2.00	85
Total TCDD	1.2	----	0.37		1,2,3,7,8-PeCDD-13C	2.00	91
					1,2,3,4,7,8-HxCDF-13C	2.00	129
1,2,3,7,8-PeCDF	0.88	----	0.86	J	1,2,3,6,7,8-HxCDF-13C	2.00	114
2,3,4,7,8-PeCDF	1.5	----	0.55	J	2,3,4,6,7,8-HxCDF-13C	2.00	124
Total PeCDF	23	----	0.55		1,2,3,7,8,9-HxCDF-13C	2.00	59
					1,2,3,4,7,8-HxCDD-13C	2.00	132
1,2,3,7,8-PeCDD	0.70	----	0.49	J	1,2,3,6,7,8-HxCDD-13C	2.00	104
Total PeCDD	5.1	----	0.49		1,2,3,4,6,7,8-HpCDF-13C	2.00	117
					1,2,3,4,7,8,9-HpCDF-13C	2.00	131
1,2,3,4,7,8-HxCDF	----	1.2	0.76	U	1,2,3,4,6,7,8-HpCDD-13C	2.00	134
1,2,3,6,7,8-HxCDF	1.5	----	0.43	J	OCDD-13C	4.00	124
2,3,4,6,7,8-HxCDF	1.5	----	0.47	J			
1,2,3,7,8,9-HxCDF	ND	----	0.47		1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	26	----	0.43		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.4	----	0.44	J	2,3,7,8-TCDD-37Cl4	0.20	75
1,2,3,6,7,8-HxCDD	4.2	----	0.37	J			
1,2,3,7,8,9-HxCDD	----	0.91	0.41	U			
Total HxCDD	44	----	0.37				
1,2,3,4,6,7,8-HpCDF	20	----	0.43		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	----	0.88	0.22	U	Equivalence: 3.7 ng/Kg		
Total HpCDF	43	----	0.22		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	100	----	0.26				
Total HpCDD	230	----	0.26				
OCDF	34	----	0.45				
OCDD	610	----	0.47				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
J = Estimated value  
I = Interference present

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N5-2A				
Lab Sample ID	10487441010				
Filename	U190830B_12				
Injected By	SMT				
Total Amount Extracted	12.4 g	Matrix	Solid		
% Moisture	16.9	Dilution	NA		
Dry Weight Extracted	10.3 g	Collected	08/13/2019 11:05		
ICAL ID	U190730	Received	08/15/2019 08:40		
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05		
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 18:11		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.76		2,3,7,8-TCDF-13C	2.00	79
Total TCDF	3.9	----	0.76		2,3,7,8-TCDD-13C	2.00	79
					1,2,3,7,8-PeCDF-13C	2.00	77
2,3,7,8-TCDD	ND	----	0.50		2,3,4,7,8-PeCDF-13C	2.00	78
Total TCDD	0.67	----	0.50	J	1,2,3,7,8-PeCDD-13C	2.00	82
					1,2,3,4,7,8-HxCDF-13C	2.00	113
1,2,3,7,8-PeCDF	----	1.2	0.68	U	1,2,3,6,7,8-HxCDF-13C	2.00	99
2,3,4,7,8-PeCDF	1.8	----	0.58	J	2,3,4,6,7,8-HxCDF-13C	2.00	106
Total PeCDF	24	----	0.58		1,2,3,7,8,9-HxCDF-13C	2.00	50
					1,2,3,4,7,8-HxCDD-13C	2.00	115
1,2,3,7,8-PeCDD	0.94	----	0.43	J	1,2,3,6,7,8-HxCDD-13C	2.00	86
Total PeCDD	6.3	----	0.43		1,2,3,4,6,7,8-HpCDF-13C	2.00	93
					1,2,3,4,7,8,9-HpCDF-13C	2.00	107
1,2,3,4,7,8-HxCDF	2.8	----	0.73	J	1,2,3,4,6,7,8-HpCDD-13C	2.00	109
1,2,3,6,7,8-HxCDF	----	1.7	0.61	U	OCDD-13C	4.00	90
2,3,4,6,7,8-HxCDF	----	0.98	0.77	U			
1,2,3,7,8,9-HxCDF	----	0.72	0.37	U	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	49	----	0.37		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.9	----	0.31	J	2,3,7,8-TCDD-37Cl4	0.20	75
1,2,3,6,7,8-HxCDD	----	3.6	0.24	U			
1,2,3,7,8,9-HxCDD	3.0	----	0.44	J			
Total HxCDD	31	----	0.24				
1,2,3,4,6,7,8-HpCDF	27	----	0.44		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	----	1.5	0.54	U	Equivalence: 4.3 ng/Kg		
Total HpCDF	68	----	0.44		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	76	----	0.46				
Total HpCDD	140	----	0.46				
OCDF	65	----	0.32				
OCDD	660	----	0.61				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
 J = Estimated value  
 I = Interference present

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N5-1A			
Lab Sample ID	10487441011			
Filename	U190830B_13			
Injected By	SMT			
Total Amount Extracted	11.5 g	Matrix	Solid	
% Moisture	12.7	Dilution	NA	
Dry Weight Extracted	10.0 g	Collected	08/13/2019 11:15	
ICAL ID	U190730	Received	08/15/2019 08:40	
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05	
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 18:54	

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.54	2,3,7,8-TCDF-13C	2.00	100
Total TCDF	2.7	----	0.54	2,3,7,8-TCDD-13C	2.00	100
				1,2,3,7,8-PeCDF-13C	2.00	96
2,3,7,8-TCDD	ND	----	0.52	2,3,4,7,8-PeCDF-13C	2.00	98
Total TCDD	1.2	----	0.52	1,2,3,7,8-PeCDD-13C	2.00	106
				1,2,3,4,7,8-HxCDF-13C	2.00	80 DN2
1,2,3,7,8-PeCDF	ND	----	0.46	1,2,3,6,7,8-HxCDF-13C	2.00	78 DN2
2,3,4,7,8-PeCDF	1.6	----	0.29 J	2,3,4,6,7,8-HxCDF-13C	2.00	74 DN2
Total PeCDF	21	----	0.29	1,2,3,7,8,9-HxCDF-13C	2.00	76 DN2
				1,2,3,4,7,8-HxCDD-13C	2.00	86 DN2
1,2,3,7,8-PeCDD	----	0.46	0.30 IJ	1,2,3,6,7,8-HxCDD-13C	2.00	73 DN2
Total PeCDD	ND	----	0.30	1,2,3,4,6,7,8-HpCDF-13C	2.00	67 DN2
				1,2,3,4,7,8,9-HpCDF-13C	2.00	68 DN2
1,2,3,4,7,8-HxCDF	1.1	----	0.28 JDN2	1,2,3,4,6,7,8-HpCDD-13C	2.00	75 DN2
1,2,3,6,7,8-HxCDF	1.1	----	0.27 JDN2	OCDD-13C	4.00	51 DN2
2,3,4,6,7,8-HxCDF	0.62	----	0.33 JDN2			
1,2,3,7,8,9-HxCDF	0.43	----	0.30 JDN2	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	23	----	0.27 JDN2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	0.77	----	0.24 BJDN2	2,3,7,8-TCDD-37Cl4	0.20	95
1,2,3,6,7,8-HxCDD	----	1.7	0.30 IJDN2			
1,2,3,7,8,9-HxCDD	----	1.3	0.29 IJDN2			
Total HxCDD	8.3	----	0.24 JDN2			
1,2,3,4,6,7,8-HpCDF	11	----	0.49 JDN2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	----	0.80	0.50 IJDN2	Equivalence: 2.2 ng/Kg		
Total HpCDF	11	----	0.49 JDN2	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	37	----	0.24 DN2			
Total HpCDD	81	----	0.24 DN2			
OCDF	25	----	0.54 JDN2			
OCDD	340	----	0.93 DN2			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

J = Estimated value  
B = Less than 10x higher than method blank level  
I = Interference present  
D = Result obtained from analysis of diluted sample  
Nn = Value obtained from additional analysis

## REPORT OF LABORATORY ANALYSIS

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N5-3				
Lab Sample ID	10487441012				
Filename	U190830B_14				
Injected By	SMT				
Total Amount Extracted	11.8 g	Matrix	Solid		
% Moisture	13.6	Dilution	NA		
Dry Weight Extracted	10.2 g	Collected	08/13/2019 11:25		
ICAL ID	U190730	Received	08/15/2019 08:40		
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05		
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 19:38		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.99	2,3,7,8-TCDF-13C	2.00	80
Total TCDF	1.4	----	0.99	2,3,7,8-TCDD-13C	2.00	82
				1,2,3,7,8-PeCDF-13C	2.00	75
2,3,7,8-TCDD	ND	----	0.97	2,3,4,7,8-PeCDF-13C	2.00	74
Total TCDD	ND	----	0.97	1,2,3,7,8-PeCDD-13C	2.00	80
				1,2,3,4,7,8-HxCDF-13C	2.00	95 DN2
1,2,3,7,8-PeCDF	ND	----	0.48	1,2,3,6,7,8-HxCDF-13C	2.00	85 DN2
2,3,4,7,8-PeCDF	1.1	----	0.86 J	2,3,4,6,7,8-HxCDF-13C	2.00	79 DN2
Total PeCDF	12	----	0.48	1,2,3,7,8,9-HxCDF-13C	2.00	43 DN2
				1,2,3,4,7,8-HxCDD-13C	2.00	94 DN2
1,2,3,7,8-PeCDD	2.4	----	0.88 J	1,2,3,6,7,8-HxCDD-13C	2.00	79 DN2
Total PeCDD	10	----	0.88	1,2,3,4,6,7,8-HpCDF-13C	2.00	65 DN2
				1,2,3,4,7,8,9-HpCDF-13C	2.00	66 DN2
1,2,3,4,7,8-HxCDF	2.0	----	0.42 JDN2	1,2,3,4,6,7,8-HpCDD-13C	2.00	67 DN2
1,2,3,6,7,8-HxCDF	1.2	----	0.41 JDN2	OCDD-13C	4.00	48 DN2
2,3,4,6,7,8-HxCDF	----	0.78	0.40 IJDN2			
1,2,3,7,8,9-HxCDF	ND	----	0.22 DN2	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	35	----	0.22 DN2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	2.5	----	0.88 JDN2	2,3,7,8-TCDD-37Cl4	0.20	75
1,2,3,6,7,8-HxCDD	5.1	----	1.3 JDN2			
1,2,3,7,8,9-HxCDD	5.0	----	0.89 JDN2			
Total HxCDD	35	----	0.88 DN2			
1,2,3,4,6,7,8-HpCDF	23	----	0.53 JDN2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	----	1.2	0.56 IJDN2	Equivalence: 6.1 ng/Kg		
Total HpCDF	58	----	0.53 DN2	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	100	----	1.1 DN2			
Total HpCDD	230	----	1.1 DN2			
OCDF	47	----	1.2 JDN2			
OCDD	1200	----	0.88 DN2			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

J = Estimated value  
I = Interference present  
D = Result obtained from analysis of diluted sample  
Nn = Value obtained from additional analysis

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N5-4		
Lab Sample ID	10487441013		
Filename	U190830B_15		
Injected By	SMT		
Total Amount Extracted	12.1 g	Matrix	Solid
% Moisture	16.6	Dilution	NA
Dry Weight Extracted	10.1 g	Collected	08/13/2019 11:35
ICAL ID	U190730	Received	08/15/2019 08:40
CCal Filename(s)	U190830B_01	Extracted	08/27/2019 15:05
Method Blank ID	BLANK-72962	Analyzed	08/30/2019 20:21

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.30	----	0.24	J	2,3,7,8-TCDF-13C	2.00	89
Total TCDF	7.0	----	0.24		2,3,7,8-TCDD-13C	2.00	89
					1,2,3,7,8-PeCDF-13C	2.00	86
2,3,7,8-TCDD	ND	----	0.42		2,3,4,7,8-PeCDF-13C	2.00	89
Total TCDD	0.61	----	0.42	J	1,2,3,7,8-PeCDD-13C	2.00	94
					1,2,3,4,7,8-HxCDF-13C	2.00	125
1,2,3,7,8-PeCDF	1.2	----	0.32	J	1,2,3,6,7,8-HxCDF-13C	2.00	108
2,3,4,7,8-PeCDF	2.7	----	0.53	J	2,3,4,6,7,8-HxCDF-13C	2.00	114
Total PeCDF	31	----	0.32		1,2,3,7,8,9-HxCDF-13C	2.00	66
					1,2,3,4,7,8-HxCDD-13C	2.00	120
1,2,3,7,8-PeCDD	2.2	----	0.34	J	1,2,3,6,7,8-HxCDD-13C	2.00	96
Total PeCDD	11	----	0.34		1,2,3,4,6,7,8-HpCDF-13C	2.00	106
					1,2,3,4,7,8,9-HpCDF-13C	2.00	116
1,2,3,4,7,8-HxCDF	3.5	----	0.19	J	1,2,3,4,6,7,8-HpCDD-13C	2.00	120
1,2,3,6,7,8-HxCDF	2.4	----	0.33	J	OCDD-13C	4.00	105
2,3,4,6,7,8-HxCDF	3.3	----	0.12	J			
1,2,3,7,8,9-HxCDF	2.5	----	0.16	J	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	110	----	0.12		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	3.6	----	0.34	J	2,3,7,8-TCDD-37Cl4	0.20	79
1,2,3,6,7,8-HxCDD	38	----	0.32				
1,2,3,7,8,9-HxCDD	5.1	----	0.17				
Total HxCDD	140	----	0.17				
1,2,3,4,6,7,8-HpCDF	55	----	0.31		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	2.8	----	0.27	J	Equivalence: 17 ng/Kg		
Total HpCDF	170	----	0.27		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	580	----	0.37				
Total HpCDD	960	----	0.37				
OCDF	230	----	0.30				
OCDD	4200	----	0.23	E			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
J = Estimated value  
E = Exceeds calibration range

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N3-4				
Lab Sample ID	10487441014				
Filename	Y190830A_10				
Injected By	ZMS				
Total Amount Extracted	11.8 g	Matrix	Solid		
% Moisture	14.5	Dilution	NA		
Dry Weight Extracted	10.1 g	Collected	08/13/2019 12:50		
ICAL ID	Y190827	Received	08/15/2019 08:40		
CCal Filename(s)	Y190830A_02	Extracted	08/28/2019 15:05		
Method Blank ID	BLANK-72988	Analyzed	08/30/2019 15:46		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.15	2,3,7,8-TCDF-13C	2.00	82
Total TCDF	0.61	----	0.15 J	2,3,7,8-TCDD-13C	2.00	77
				1,2,3,7,8-PeCDF-13C	2.00	70
2,3,7,8-TCDD	ND	----	0.14	2,3,4,7,8-PeCDF-13C	2.00	68
Total TCDD	0.55	----	0.14 J	1,2,3,7,8-PeCDD-13C	2.00	69
				1,2,3,4,7,8-HxCDF-13C	2.00	82
1,2,3,7,8-PeCDF	ND	----	0.14	1,2,3,6,7,8-HxCDF-13C	2.00	82
2,3,4,7,8-PeCDF	ND	----	0.12	2,3,4,6,7,8-HxCDF-13C	2.00	84
Total PeCDF	1.5	----	0.12 J	1,2,3,7,8,9-HxCDF-13C	2.00	78
				1,2,3,4,7,8-HxCDD-13C	2.00	79
1,2,3,7,8-PeCDD	ND	----	0.26	1,2,3,6,7,8-HxCDD-13C	2.00	72
Total PeCDD	0.50	----	0.26 J	1,2,3,4,6,7,8-HpCDF-13C	2.00	70
				1,2,3,4,7,8,9-HpCDF-13C	2.00	70
1,2,3,4,7,8-HxCDF	0.22	----	0.18 J	1,2,3,4,6,7,8-HpCDD-13C	2.00	69
1,2,3,6,7,8-HxCDF	----	0.21	0.16 U	OCDD-13C	4.00	57
2,3,4,6,7,8-HxCDF	0.22	----	0.13 J			
1,2,3,7,8,9-HxCDF	ND	----	0.15	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	1.9	----	0.13 J	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	0.29	2,3,7,8-TCDD-37Cl4	0.20	82
1,2,3,6,7,8-HxCDD	----	0.44	0.30 U			
1,2,3,7,8,9-HxCDD	ND	----	0.32			
Total HxCDD	3.0	----	0.29 J			
1,2,3,4,6,7,8-HpCDF	2.7	----	0.43 J	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	0.36	Equivalence: 0.27 ng/Kg		
Total HpCDF	7.0	----	0.36	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	11	----	0.14			
Total HpCDD	21	----	0.14			
OCDF	6.6	----	0.44 J			
OCDD	90	----	0.32			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
J = Estimated value  
I = Interference present

## REPORT OF LABORATORY ANALYSIS

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N3-3				
Lab Sample ID	10487441015				
Filename	Y190830A_11				
Injected By	ZMS				
Total Amount Extracted	11.9 g	Matrix		Solid	
% Moisture	12.9	Dilution		NA	
Dry Weight Extracted	10.3 g	Collected		08/13/2019 13:00	
ICAL ID	Y190827	Received		08/15/2019 08:40	
CCal Filename(s)	Y190830A_02	Extracted		08/28/2019 15:05	
Method Blank ID	BLANK-72988	Analyzed		08/30/2019 16:31	

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.15	----	0.10	J	2,3,7,8-TCDF-13C	2.00	84
Total TCDF	3.1	----	0.10		2,3,7,8-TCDD-13C	2.00	80
					1,2,3,7,8-PeCDF-13C	2.00	80
2,3,7,8-TCDD	ND	----	0.098		2,3,4,7,8-PeCDF-13C	2.00	85
Total TCDD	0.36	----	0.098	J	1,2,3,7,8-PeCDD-13C	2.00	88
					1,2,3,4,7,8-HxCDF-13C	2.00	78
1,2,3,7,8-PeCDF	0.14	----	0.080	J	1,2,3,6,7,8-HxCDF-13C	2.00	81
2,3,4,7,8-PeCDF	0.35	----	0.094	J	2,3,4,6,7,8-HxCDF-13C	2.00	82
Total PeCDF	6.4	----	0.080		1,2,3,7,8,9-HxCDF-13C	2.00	64
					1,2,3,4,7,8-HxCDD-13C	2.00	83
1,2,3,7,8-PeCDD	0.16	----	0.16	J	1,2,3,6,7,8-HxCDD-13C	2.00	67
Total PeCDD	0.96	----	0.16	J	1,2,3,4,6,7,8-HpCDF-13C	2.00	68
					1,2,3,4,7,8,9-HpCDF-13C	2.00	69
1,2,3,4,7,8-HxCDF	0.29	----	0.16	J	1,2,3,4,6,7,8-HpCDD-13C	2.00	67
1,2,3,6,7,8-HxCDF	----	0.33	0.11	I	OCDD-13C	4.00	62
2,3,4,6,7,8-HxCDF	----	0.23	0.15	I			
1,2,3,7,8,9-HxCDF	ND	----	0.075		1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	6.4	----	0.075		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	0.19	----	0.091	J	2,3,7,8-TCDD-37Cl4	0.20	82
1,2,3,6,7,8-HxCDD	0.73	----	0.077	J			
1,2,3,7,8,9-HxCDD	0.40	----	0.075	J			
Total HxCDD	6.1	----	0.075				
1,2,3,4,6,7,8-HpCDF	6.1	----	0.12		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	0.29	----	0.10	J	Equivalence: 0.74 ng/Kg		
Total HpCDF	13	----	0.10		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	14	----	0.076				
Total HpCDD	28	----	0.076				
OCDF	9.6	----	0.24	J			
OCDD	110	----	0.39				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
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 NC = Not Calculated

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N3-2				
Lab Sample ID	10487441016				
Filename	Y190830A_12				
Injected By	ZMS				
Total Amount Extracted	11.3 g	Matrix	Solid		
% Moisture	9.6	Dilution	NA		
Dry Weight Extracted	10.2 g	Collected	08/13/2019 13:10		
ICAL ID	Y190827	Received	08/15/2019 08:40		
CCal Filename(s)	Y190830A_02	Extracted	08/28/2019 15:05		
Method Blank ID	BLANK-72988	Analyzed	08/30/2019 17:17		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	----	0.30	0.075	U	2,3,7,8-TCDF-13C	2.00	75
Total TCDF	11	----	0.075		2,3,7,8-TCDD-13C	2.00	72
					1,2,3,7,8-PeCDF-13C	2.00	75
2,3,7,8-TCDD	ND	----	0.13		2,3,4,7,8-PeCDF-13C	2.00	76
Total TCDD	8.7	----	0.13		1,2,3,7,8-PeCDD-13C	2.00	77
					1,2,3,4,7,8-HxCDF-13C	2.00	77
1,2,3,7,8-PeCDF	0.77	----	0.25	J	1,2,3,6,7,8-HxCDF-13C	2.00	75
2,3,4,7,8-PeCDF	1.2	----	0.18	J	2,3,4,6,7,8-HxCDF-13C	2.00	76
Total PeCDF	23	----	0.18		1,2,3,7,8,9-HxCDF-13C	2.00	76
					1,2,3,4,7,8-HxCDD-13C	2.00	72
1,2,3,7,8-PeCDD	0.46	----	0.34	J	1,2,3,6,7,8-HxCDD-13C	2.00	67
Total PeCDD	21	----	0.34		1,2,3,4,6,7,8-HpCDF-13C	2.00	67
					1,2,3,4,7,8,9-HpCDF-13C	2.00	68
1,2,3,4,7,8-HxCDF	3.2	----	0.15	J	1,2,3,4,6,7,8-HpCDD-13C	2.00	67
1,2,3,6,7,8-HxCDF	2.4	----	0.11	J	OCDD-13C	4.00	64
2,3,4,6,7,8-HxCDF	3.6	----	0.14	J			
1,2,3,7,8,9-HxCDF	----	0.98	0.095	U	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	34	----	0.095		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	0.85	----	0.26	J	2,3,7,8-TCDD-37Cl4	0.20	77
1,2,3,6,7,8-HxCDD	2.9	----	0.32	J			
1,2,3,7,8,9-HxCDD	----	1.6	0.39	U			
Total HxCDD	47	----	0.26				
1,2,3,4,6,7,8-HpCDF	26	----	0.17		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	2.4	----	0.37	J	Equivalence: 3.2 ng/Kg		
Total HpCDF	47	----	0.17		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	39	----	0.43				
Total HpCDD	79	----	0.43				
OCDF	34	----	0.56				
OCDD	220	----	0.94				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N3-1			
Lab Sample ID	10487441017			
Filename	Y190830A_13			
Injected By	ZMS			
Total Amount Extracted	10.9 g	Matrix	Solid	
% Moisture	8.0	Dilution	NA	
Dry Weight Extracted	10.1 g	Collected	08/13/2019 13:20	
ICAL ID	Y190827	Received	08/15/2019 08:40	
CCal Filename(s)	Y190830A_02	Extracted	08/28/2019 15:05	
Method Blank ID	BLANK-72988	Analyzed	08/30/2019 18:03	

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.45	----	0.054	J	2,3,7,8-TCDF-13C	2.00	80
Total TCDF	15	----	0.054		2,3,7,8-TCDD-13C	2.00	77
					1,2,3,7,8-PeCDF-13C	2.00	79
2,3,7,8-TCDD	ND	----	0.13		2,3,4,7,8-PeCDF-13C	2.00	80
Total TCDD	15	----	0.13		1,2,3,7,8-PeCDD-13C	2.00	82
					1,2,3,4,7,8-HxCDF-13C	2.00	74
1,2,3,7,8-PeCDF	1.2	----	0.14	J	1,2,3,6,7,8-HxCDF-13C	2.00	77
2,3,4,7,8-PeCDF	2.2	----	0.18	J	2,3,4,6,7,8-HxCDF-13C	2.00	76
Total PeCDF	36	----	0.14		1,2,3,7,8,9-HxCDF-13C	2.00	66
					1,2,3,4,7,8-HxCDD-13C	2.00	76
1,2,3,7,8-PeCDD	0.83	----	0.20	J	1,2,3,6,7,8-HxCDD-13C	2.00	65
Total PeCDD	38	----	0.20		1,2,3,4,6,7,8-HpCDF-13C	2.00	65
					1,2,3,4,7,8,9-HpCDF-13C	2.00	66
1,2,3,4,7,8-HxCDF	5.3	----	0.23		1,2,3,4,6,7,8-HpCDD-13C	2.00	64
1,2,3,6,7,8-HxCDF	4.3	----	0.23	J	OCDD-13C	4.00	73
2,3,4,6,7,8-HxCDF	6.1	----	0.18				
1,2,3,7,8,9-HxCDF	1.9	----	0.096	J	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	59	----	0.096		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	----	1.2	0.51	I	2,3,7,8-TCDD-37Cl4	0.20	79
1,2,3,6,7,8-HxCDD	4.4	----	0.34	J			
1,2,3,7,8,9-HxCDD	3.0	----	0.091	J			
Total HxCDD	77	----	0.091				
1,2,3,4,6,7,8-HpCDF	44	----	0.12		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	3.8	----	0.51	J	Equivalence: 5.4 ng/Kg		
Total HpCDF	76	----	0.12		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	58	----	0.10				
Total HpCDD	120	----	0.10				
OCDF	50	----	0.21				
OCDD	320	----	0.44				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N1-2				
Lab Sample ID	10487441018				
Filename	Y190830A_14				
Injected By	ZMS				
Total Amount Extracted	11.8 g	Matrix		Solid	
% Moisture	12.8	Dilution		NA	
Dry Weight Extracted	10.3 g	Collected		08/13/2019 13:40	
ICAL ID	Y190827	Received		08/15/2019 08:40	
CCal Filename(s)	Y190830A_02	Extracted		08/28/2019 15:05	
Method Blank ID	BLANK-72988	Analyzed		08/30/2019 18:48	

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	1.9	----	0.46	C	2,3,7,8-TCDF-13C	2.00	74
Total TCDF	58	----	0.12		2,3,7,8-TCDD-13C	2.00	71
					1,2,3,7,8-PeCDF-13C	2.00	75
2,3,7,8-TCDD	0.26	----	0.13	J	2,3,4,7,8-PeCDF-13C	2.00	74
Total TCDD	7.8	----	0.13		1,2,3,7,8-PeCDD-13C	2.00	79
					1,2,3,4,7,8-HxCDF-13C	2.00	74
1,2,3,7,8-PeCDF	0.95	----	0.15	J	1,2,3,6,7,8-HxCDF-13C	2.00	75
2,3,4,7,8-PeCDF	12	----	0.18		2,3,4,6,7,8-HxCDF-13C	2.00	76
Total PeCDF	180	----	0.15		1,2,3,7,8,9-HxCDF-13C	2.00	69
					1,2,3,4,7,8-HxCDD-13C	2.00	74
1,2,3,7,8-PeCDD	----	1.0	0.30	IJ	1,2,3,6,7,8-HxCDD-13C	2.00	64
Total PeCDD	15	----	0.30		1,2,3,4,6,7,8-HpCDF-13C	2.00	66
					1,2,3,4,7,8,9-HpCDF-13C	2.00	68
1,2,3,4,7,8-HxCDF	4.0	----	0.19	J	1,2,3,4,6,7,8-HpCDD-13C	2.00	65
1,2,3,6,7,8-HxCDF	5.5	----	0.16		OCDD-13C	4.00	61
2,3,4,6,7,8-HxCDF	2.6	----	0.12	J			
1,2,3,7,8,9-HxCDF	1.5	----	0.11	J	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	110	----	0.11		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.4	----	0.32	J	2,3,7,8-TCDD-37Cl4	0.20	75
1,2,3,6,7,8-HxCDD	6.6	----	0.13				
1,2,3,7,8,9-HxCDD	2.8	----	0.098	J			
Total HxCDD	61	----	0.098				
1,2,3,4,6,7,8-HpCDF	60	----	0.071		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	2.0	----	0.12	J	Equivalence: 10 ng/Kg		
Total HpCDF	140	----	0.071		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	180	----	0.11				
Total HpCDD	340	----	0.11				
OCDF	85	----	0.24				
OCDD	1800	----	0.12				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

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J = Estimated value

I = Interference present

C = Result obtained from confirmation analysis

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N1-3				
Lab Sample ID	10487441019				
Filename	Y190830A_15				
Injected By	ZMS				
Total Amount Extracted	11.6 g	Matrix		Solid	
% Moisture	9.7	Dilution		NA	
Dry Weight Extracted	10.4 g	Collected		08/13/2019 14:25	
ICAL ID	Y190827	Received		08/15/2019 08:40	
CCal Filename(s)	Y190830A_02	Extracted		08/28/2019 15:05	
Method Blank ID	BLANK-72988	Analyzed		08/30/2019 19:34	

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	----	0.13	0.093	J	2,3,7,8-TCDF-13C	2.00	67
Total TCDF	1.3	----	0.093		2,3,7,8-TCDD-13C	2.00	65
					1,2,3,7,8-PeCDF-13C	2.00	69
2,3,7,8-TCDD	ND	----	0.12		2,3,4,7,8-PeCDF-13C	2.00	68
Total TCDD	0.90	----	0.12	J	1,2,3,7,8-PeCDD-13C	2.00	72
					1,2,3,4,7,8-HxCDF-13C	2.00	72
1,2,3,7,8-PeCDF	0.10	----	0.077	J	1,2,3,6,7,8-HxCDF-13C	2.00	63
2,3,4,7,8-PeCDF	0.38	----	0.091	J	2,3,4,6,7,8-HxCDF-13C	2.00	64
Total PeCDF	6.2	----	0.077		1,2,3,7,8,9-HxCDF-13C	2.00	54
					1,2,3,4,7,8-HxCDD-13C	2.00	67
1,2,3,7,8-PeCDD	0.23	----	0.19	J	1,2,3,6,7,8-HxCDD-13C	2.00	54
Total PeCDD	1.4	----	0.19	J	1,2,3,4,6,7,8-HpCDF-13C	2.00	57
					1,2,3,4,7,8,9-HpCDF-13C	2.00	56
1,2,3,4,7,8-HxCDF	0.32	----	0.11	J	1,2,3,4,6,7,8-HpCDD-13C	2.00	56
1,2,3,6,7,8-HxCDF	0.26	----	0.11	J	OCDD-13C	4.00	44
2,3,4,6,7,8-HxCDF	0.34	----	0.063	J			
1,2,3,7,8,9-HxCDF	ND	----	0.041		1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	7.9	----	0.041		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	0.43	----	0.11	J	2,3,7,8-TCDD-37Cl4	0.20	68
1,2,3,6,7,8-HxCDD	0.90	----	0.12	J			
1,2,3,7,8,9-HxCDD	0.71	----	0.066	J			
Total HxCDD	9.2	----	0.066				
1,2,3,4,6,7,8-HpCDF	6.5	----	0.14		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	----	0.33	0.082	J	Equivalence: 0.99 ng/Kg		
Total HpCDF	14	----	0.082		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	20	----	0.15				
Total HpCDD	42	----	0.15				
OCDF	18	----	0.20				
OCDD	190	----	0.15				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N1-1		
Lab Sample ID	10487441020		
Filename	F190831A_03		
Injected By	JRH		
Total Amount Extracted	12.0 g	Matrix	Solid
% Moisture	11.0	Dilution	NA
Dry Weight Extracted	10.6 g	Collected	08/13/2019 14:40
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 06:00

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.47	2,3,7,8-TCDF-13C	2.00	69
Total TCDF	5.3	----	0.47	2,3,7,8-TCDD-13C	2.00	78
				1,2,3,7,8-PeCDF-13C	2.00	74
2,3,7,8-TCDD	ND	----	0.22	2,3,4,7,8-PeCDF-13C	2.00	72
Total TCDD	3.9	----	0.22	1,2,3,7,8-PeCDD-13C	2.00	83
				1,2,3,4,7,8-HxCDF-13C	2.00	66
1,2,3,7,8-PeCDF	0.35	----	0.33 J	1,2,3,6,7,8-HxCDF-13C	2.00	71
2,3,4,7,8-PeCDF	0.80	----	0.25 J	2,3,4,6,7,8-HxCDF-13C	2.00	69
Total PeCDF	14	----	0.25	1,2,3,7,8,9-HxCDF-13C	2.00	72
				1,2,3,4,7,8-HxCDD-13C	2.00	65
1,2,3,7,8-PeCDD	0.51	----	0.19 J	1,2,3,6,7,8-HxCDD-13C	2.00	69
Total PeCDD	4.4	----	0.19 J	1,2,3,4,6,7,8-HpCDF-13C	2.00	77
				1,2,3,4,7,8,9-HpCDF-13C	2.00	84
1,2,3,4,7,8-HxCDF	0.85	----	0.22 J	1,2,3,4,6,7,8-HpCDD-13C	2.00	93
1,2,3,6,7,8-HxCDF	0.94	----	0.16 J	OCDD-13C	4.00	74
2,3,4,6,7,8-HxCDF	0.77	----	0.17 J			
1,2,3,7,8,9-HxCDF	0.31	----	0.14 J	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	15	----	0.14	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	0.77	----	0.43 J	2,3,7,8-TCDD-37Cl4	0.20	72
1,2,3,6,7,8-HxCDD	2.2	----	0.29 J			
1,2,3,7,8,9-HxCDD	1.5	----	0.21 J			
Total HxCDD	19	----	0.21			
1,2,3,4,6,7,8-HpCDF	8.8	----	0.41	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	0.59	----	0.37 J	Equivalence: 2.3 ng/Kg		
Total HpCDF	27	----	0.37	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	54	----	0.11			
Total HpCDD	100	----	0.11			
OCDF	27	----	0.74			
OCDD	600	----	0.30			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
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 NC = Not Calculated

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 J = Estimated value

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N1-5		
Lab Sample ID	10487441021		
Filename	F190831A_04		
Injected By	JRH		
Total Amount Extracted	11.4 g	Matrix	Solid
% Moisture	11.3	Dilution	NA
Dry Weight Extracted	10.1 g	Collected	08/13/2019 14:45
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 06:46

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.31		2,3,7,8-TCDF-13C	2.00	75
Total TCDF	7.2	----	0.31		2,3,7,8-TCDD-13C	2.00	87
					1,2,3,7,8-PeCDF-13C	2.00	79
2,3,7,8-TCDD	ND	----	0.22		2,3,4,7,8-PeCDF-13C	2.00	79
Total TCDD	2.3	----	0.22		1,2,3,7,8-PeCDD-13C	2.00	92
					1,2,3,4,7,8-HxCDF-13C	2.00	84
1,2,3,7,8-PeCDF	ND	----	0.41		1,2,3,6,7,8-HxCDF-13C	2.00	83
2,3,4,7,8-PeCDF	----	1.4	0.24	J	2,3,4,6,7,8-HxCDF-13C	2.00	80
Total PeCDF	24	----	0.24		1,2,3,7,8,9-HxCDF-13C	2.00	72
					1,2,3,4,7,8-HxCDD-13C	2.00	84
1,2,3,7,8-PeCDD	----	0.62	0.28	J	1,2,3,6,7,8-HxCDD-13C	2.00	78
Total PeCDD	6.7	----	0.28		1,2,3,4,6,7,8-HpCDF-13C	2.00	76
					1,2,3,4,7,8,9-HpCDF-13C	2.00	74
1,2,3,4,7,8-HxCDF	1.1	----	0.20	J	1,2,3,4,6,7,8-HpCDD-13C	2.00	88
1,2,3,6,7,8-HxCDF	----	0.80	0.14	J	OCDD-13C	4.00	53
2,3,4,6,7,8-HxCDF	----	0.58	0.15	J			
1,2,3,7,8,9-HxCDF	ND	----	0.12		1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	20	----	0.12		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.3	----	0.39	J	2,3,7,8-TCDD-37Cl4	0.20	83
1,2,3,6,7,8-HxCDD	2.5	----	0.43	J			
1,2,3,7,8,9-HxCDD	2.3	----	0.20	J			
Total HxCDD	31	----	0.20				
1,2,3,4,6,7,8-HpCDF	11	----	0.26		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	----	0.56	0.34	J	Equivalence: 2.9 ng/Kg		
Total HpCDF	26	----	0.26		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	71	----	0.66				
Total HpCDD	140	----	0.66				
OCDF	28	----	1.7				
OCDD	640	----	0.41				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

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 NC = Not Calculated

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N1-4				
Lab Sample ID	10487441022				
Filename	F190831A_05				
Injected By	JRH				
Total Amount Extracted	11.5 g		Matrix		Solid
% Moisture	10.5		Dilution		NA
Dry Weight Extracted	10.3 g		Collected	08/13/2019	15:00
ICAL ID	F190827		Received	08/15/2019	08:40
CCal Filename(s)	F190831A_01		Extracted	08/28/2019	15:05
Method Blank ID	BLANK-72988		Analyzed	08/31/2019	07:32

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.25	----	0.18	J	2,3,7,8-TCDF-13C	2.00	61
Total TCDF	4.2	----	0.18		2,3,7,8-TCDD-13C	2.00	71
					1,2,3,7,8-PeCDF-13C	2.00	68
2,3,7,8-TCDD	ND	----	0.21		2,3,4,7,8-PeCDF-13C	2.00	66
Total TCDD	2.8	----	0.21		1,2,3,7,8-PeCDD-13C	2.00	78
					1,2,3,4,7,8-HxCDF-13C	2.00	66
1,2,3,7,8-PeCDF	ND	----	0.31		1,2,3,6,7,8-HxCDF-13C	2.00	66
2,3,4,7,8-PeCDF	0.72	----	0.20	J	2,3,4,6,7,8-HxCDF-13C	2.00	68
Total PeCDF	11	----	0.20		1,2,3,7,8,9-HxCDF-13C	2.00	65
					1,2,3,4,7,8-HxCDD-13C	2.00	69
1,2,3,7,8-PeCDD	0.24	----	0.24	J	1,2,3,6,7,8-HxCDD-13C	2.00	63
Total PeCDD	5.0	----	0.24		1,2,3,4,6,7,8-HpCDF-13C	2.00	71
					1,2,3,4,7,8,9-HpCDF-13C	2.00	74
1,2,3,4,7,8-HxCDF	----	0.71	0.33	IJ	1,2,3,4,6,7,8-HpCDD-13C	2.00	85
1,2,3,6,7,8-HxCDF	0.79	----	0.29	J	OCDD-13C	4.00	61
2,3,4,6,7,8-HxCDF	1.3	----	0.26	J			
1,2,3,7,8,9-HxCDF	----	0.32	0.26	IJ	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	10	----	0.26		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	0.41	----	0.25	J	2,3,7,8-TCDD-37Cl4	0.20	66
1,2,3,6,7,8-HxCDD	0.96	----	0.42	J			
1,2,3,7,8,9-HxCDD	0.86	----	0.42	J			
Total HxCDD	13	----	0.25				
1,2,3,4,6,7,8-HpCDF	8.1	----	0.23		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	0.66	----	0.20	J	Equivalence: 1.3 ng/Kg		
Total HpCDF	16	----	0.20		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	16	----	0.23				
Total HpCDD	32	----	0.23				
OCDF	17	----	0.34				
OCDD	120	----	0.60				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	O-10		
Lab Sample ID	10487441023		
Filename	F190831A_06		
Injected By	JRH		
Total Amount Extracted	13.1 g	Matrix	Solid
% Moisture	21.7	Dilution	NA
Dry Weight Extracted	10.3 g	Collected	08/13/2019 15:30
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 08:18

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.80	----	0.39	J	2,3,7,8-TCDF-13C	2.00	54
Total TCDF	13	----	0.39		2,3,7,8-TCDD-13C	2.00	63
					1,2,3,7,8-PeCDF-13C	2.00	56
2,3,7,8-TCDD	ND	----	0.27		2,3,4,7,8-PeCDF-13C	2.00	58
Total TCDD	2.9	----	0.27		1,2,3,7,8-PeCDD-13C	2.00	67
					1,2,3,4,7,8-HxCDF-13C	2.00	56
1,2,3,7,8-PeCDF	0.92	----	0.62	J	1,2,3,6,7,8-HxCDF-13C	2.00	57
2,3,4,7,8-PeCDF	1.7	----	0.27	J	2,3,4,6,7,8-HxCDF-13C	2.00	57
Total PeCDF	37	----	0.27		1,2,3,7,8,9-HxCDF-13C	2.00	55
					1,2,3,4,7,8-HxCDD-13C	2.00	59
1,2,3,7,8-PeCDD	0.61	----	0.31	J	1,2,3,6,7,8-HxCDD-13C	2.00	53
Total PeCDD	4.4	----	0.31	J	1,2,3,4,6,7,8-HpCDF-13C	2.00	61
					1,2,3,4,7,8,9-HpCDF-13C	2.00	64
1,2,3,4,7,8-HxCDF	2.1	----	0.35	J	1,2,3,4,6,7,8-HpCDD-13C	2.00	74
1,2,3,6,7,8-HxCDF	2.0	----	0.21	J	OCDD-13C	4.00	54
2,3,4,6,7,8-HxCDF	1.2	----	0.31	J			
1,2,3,7,8,9-HxCDF	0.43	----	0.22	J	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	37	----	0.21		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	----	1.1	0.32	I	2,3,7,8-TCDD-37Cl4	0.20	58
1,2,3,6,7,8-HxCDD	3.0	----	0.32	J			
1,2,3,7,8,9-HxCDD	1.9	----	0.33	J			
Total HxCDD	26	----	0.32				
1,2,3,4,6,7,8-HpCDF	25	----	0.38		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	1.4	----	0.43	J	Equivalence: 3.6 ng/Kg		
Total HpCDF	56	----	0.38		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	70	----	0.20				
Total HpCDD	140	----	0.20				
OCDF	45	----	0.26				
OCDD	570	----	0.35				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	O-09		
Lab Sample ID	10487441024		
Filename	F190831A_07		
Injected By	JRH		
Total Amount Extracted	11.8 g	Matrix	Solid
% Moisture	11.3	Dilution	NA
Dry Weight Extracted	10.5 g	Collected	08/13/2019 15:45
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 09:04

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	1.6	----	0.88	C	2,3,7,8-TCDF-13C	2.00	67
Total TCDF	53	----	0.11		2,3,7,8-TCDD-13C	2.00	78
					1,2,3,7,8-PeCDF-13C	2.00	71
2,3,7,8-TCDD	0.24	----	0.16	J	2,3,4,7,8-PeCDF-13C	2.00	69
Total TCDD	4.4	----	0.16		1,2,3,7,8-PeCDD-13C	2.00	82
					1,2,3,4,7,8-HxCDF-13C	2.00	69
1,2,3,7,8-PeCDF	1.8	----	0.22	J	1,2,3,6,7,8-HxCDF-13C	2.00	72
2,3,4,7,8-PeCDF	12	----	0.28		2,3,4,6,7,8-HxCDF-13C	2.00	69
Total PeCDF	310	----	0.22		1,2,3,7,8,9-HxCDF-13C	2.00	70
					1,2,3,4,7,8-HxCDD-13C	2.00	72
1,2,3,7,8-PeCDD	2.3	----	0.50	J	1,2,3,6,7,8-HxCDD-13C	2.00	68
Total PeCDD	14	----	0.50		1,2,3,4,6,7,8-HpCDF-13C	2.00	68
					1,2,3,4,7,8,9-HpCDF-13C	2.00	66
1,2,3,4,7,8-HxCDF	7.3	----	0.40		1,2,3,4,6,7,8-HpCDD-13C	2.00	81
1,2,3,6,7,8-HxCDF	5.0	----	0.46		OCDD-13C	4.00	49
2,3,4,6,7,8-HxCDF	7.0	----	0.32				
1,2,3,7,8,9-HxCDF	1.8	----	0.34	J	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	250	----	0.32		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	5.6	----	0.43		2,3,7,8-TCDD-37Cl4	0.20	74
1,2,3,6,7,8-HxCDD	14	----	0.23				
1,2,3,7,8,9-HxCDD	10	----	0.23				
Total HxCDD	140	----	0.23				
1,2,3,4,6,7,8-HpCDF	140	----	0.89		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	6.4	----	1.7		Equivalence: 18 ng/Kg		
Total HpCDF	250	----	0.89		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	330	----	0.16				
Total HpCDD	710	----	0.16				
OCDF	220	----	0.32				
OCDD	4000	----	0.51				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
J = Estimated value  
C = Result obtained from confirmation analysis

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	O-01		
Lab Sample ID	10487441025		
Filename	F190831A_08		
Injected By	JRH		
Total Amount Extracted	11.0 g	Matrix	Solid
% Moisture	8.7	Dilution	NA
Dry Weight Extracted	10.1 g	Collected	08/13/2019 16:00
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 09:50

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.26	2,3,7,8-TCDF-13C	2.00	66
Total TCDF	1.2	----	0.26	2,3,7,8-TCDD-13C	2.00	76
				1,2,3,7,8-PeCDF-13C	2.00	72
2,3,7,8-TCDD	ND	----	0.18	2,3,4,7,8-PeCDF-13C	2.00	70
Total TCDD	0.79	----	0.18 J	1,2,3,7,8-PeCDD-13C	2.00	85
				1,2,3,4,7,8-HxCDF-13C	2.00	70
1,2,3,7,8-PeCDF	ND	----	0.28	1,2,3,6,7,8-HxCDF-13C	2.00	68
2,3,4,7,8-PeCDF	0.39	----	0.18 J	2,3,4,6,7,8-HxCDF-13C	2.00	68
Total PeCDF	3.8	----	0.18 J	1,2,3,7,8,9-HxCDF-13C	2.00	59
				1,2,3,4,7,8-HxCDD-13C	2.00	77
1,2,3,7,8-PeCDD	----	0.27	0.20 IJ	1,2,3,6,7,8-HxCDD-13C	2.00	68
Total PeCDD	0.27	----	0.20 J	1,2,3,4,6,7,8-HpCDF-13C	2.00	72
				1,2,3,4,7,8,9-HpCDF-13C	2.00	73
1,2,3,4,7,8-HxCDF	0.53	----	0.31 J	1,2,3,4,6,7,8-HpCDD-13C	2.00	84
1,2,3,6,7,8-HxCDF	0.50	----	0.31 J	OCDD-13C	4.00	59
2,3,4,6,7,8-HxCDF	0.61	----	0.26 J			
1,2,3,7,8,9-HxCDF	0.28	----	0.17 J	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	6.5	----	0.17	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	0.38	2,3,7,8-TCDD-37Cl4	0.20	75
1,2,3,6,7,8-HxCDD	0.67	----	0.41 J			
1,2,3,7,8,9-HxCDD	----	0.68	0.38 IJ			
Total HxCDD	5.2	----	0.38			
1,2,3,4,6,7,8-HpCDF	4.6	----	0.32 J	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	0.47	----	0.34 J	Equivalence: 0.93 ng/Kg		
Total HpCDF	11	----	0.32	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	13	----	0.21			
Total HpCDD	30	----	0.21			
OCDF	13	----	0.38			
OCDD	110	----	0.29			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
 J = Estimated value  
 I = Interference present

## REPORT OF LABORATORY ANALYSIS

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	O-04				
Lab Sample ID	10487441026				
Filename	F190831A_09				
Injected By	JRH				
Total Amount Extracted	11.2 g	Matrix		Solid	
% Moisture	10.0	Dilution		NA	
Dry Weight Extracted	10.1 g	Collected		08/13/2019 16:15	
ICAL ID	F190827	Received		08/15/2019 08:40	
CCal Filename(s)	F190831A_01	Extracted		08/28/2019 15:05	
Method Blank ID	BLANK-72988	Analyzed		08/31/2019 10:36	

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.38	2,3,7,8-TCDF-13C	2.00	60
Total TCDF	3.0	----	0.38	2,3,7,8-TCDD-13C	2.00	69
				1,2,3,7,8-PeCDF-13C	2.00	61
2,3,7,8-TCDD	ND	----	0.21	2,3,4,7,8-PeCDF-13C	2.00	61
Total TCDD	0.63	----	0.21 J	1,2,3,7,8-PeCDD-13C	2.00	72
				1,2,3,4,7,8-HxCDF-13C	2.00	61
1,2,3,7,8-PeCDF	ND	----	0.46	1,2,3,6,7,8-HxCDF-13C	2.00	64
2,3,4,7,8-PeCDF	0.78	----	0.27 J	2,3,4,6,7,8-HxCDF-13C	2.00	62
Total PeCDF	19	----	0.27	1,2,3,7,8,9-HxCDF-13C	2.00	58
				1,2,3,4,7,8-HxCDD-13C	2.00	66
1,2,3,7,8-PeCDD	----	0.34	0.23 IJ	1,2,3,6,7,8-HxCDD-13C	2.00	62
Total PeCDD	5.3	----	0.23	1,2,3,4,6,7,8-HpCDF-13C	2.00	65
				1,2,3,4,7,8,9-HpCDF-13C	2.00	66
1,2,3,4,7,8-HxCDF	1.1	----	0.60 J	1,2,3,4,6,7,8-HpCDD-13C	2.00	78
1,2,3,6,7,8-HxCDF	1.2	----	0.73 J	OCDD-13C	4.00	53
2,3,4,6,7,8-HxCDF	----	1.1	0.58 IJ			
1,2,3,7,8,9-HxCDF	ND	----	0.28	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	21	----	0.28	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	2.0	----	0.57 J	2,3,7,8-TCDD-37Cl4	0.20	64
1,2,3,6,7,8-HxCDD	3.0	----	0.61 J			
1,2,3,7,8,9-HxCDD	2.4	----	0.61 J			
Total HxCDD	74	----	0.57			
1,2,3,4,6,7,8-HpCDF	19	----	0.63	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	0.96	----	0.79 J	Equivalence: 3.0 ng/Kg		
Total HpCDF	53	----	0.63	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	99	----	0.21			
Total HpCDD	410	----	0.21			
OCDF	57	----	0.67			
OCDD	580	----	0.62			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	O-05				
Lab Sample ID	10487441027				
Filename	F190831A_10				
Injected By	JRH				
Total Amount Extracted	12.1 g	Matrix	Solid		
% Moisture	13.2	Dilution	NA		
Dry Weight Extracted	10.5 g	Collected	08/13/2019 16:25		
ICAL ID	F190827	Received	08/15/2019 08:40		
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05		
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 11:22		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.50	----	0.21	J	2,3,7,8-TCDF-13C	2.00	60
Total TCDF	11	----	0.21		2,3,7,8-TCDD-13C	2.00	71
					1,2,3,7,8-PeCDF-13C	2.00	60
2,3,7,8-TCDD	ND	----	0.26		2,3,4,7,8-PeCDF-13C	2.00	59
Total TCDD	1.7	----	0.26		1,2,3,7,8-PeCDD-13C	2.00	73
					1,2,3,4,7,8-HxCDF-13C	2.00	79
1,2,3,7,8-PeCDF	ND	----	0.87		1,2,3,6,7,8-HxCDF-13C	2.00	72
2,3,4,7,8-PeCDF	1.7	----	0.45	J	2,3,4,6,7,8-HxCDF-13C	2.00	69
Total PeCDF	46	----	0.45		1,2,3,7,8,9-HxCDF-13C	2.00	59
					1,2,3,4,7,8-HxCDD-13C	2.00	76
1,2,3,7,8-PeCDD	1.1	----	0.50	J	1,2,3,6,7,8-HxCDD-13C	2.00	57
Total PeCDD	11	----	0.50		1,2,3,4,6,7,8-HpCDF-13C	2.00	53
					1,2,3,4,7,8,9-HpCDF-13C	2.00	47
1,2,3,4,7,8-HxCDF	2.8	----	0.37	J	1,2,3,4,6,7,8-HpCDD-13C	2.00	59
1,2,3,6,7,8-HxCDF	2.5	----	0.32	J	OCDD-13C	4.00	31
2,3,4,6,7,8-HxCDF	3.0	----	0.31	J			
1,2,3,7,8,9-HxCDF	ND	----	0.45		1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	66	----	0.31		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.9	----	0.68	J	2,3,7,8-TCDD-37Cl4	0.20	64
1,2,3,6,7,8-HxCDD	7.7	----	0.52				
1,2,3,7,8,9-HxCDD	4.7	----	0.67	J			
Total HxCDD	92	----	0.52				
1,2,3,4,6,7,8-HpCDF	43	----	0.90		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	2.2	----	0.67	J	Equivalence: 6.6 ng/Kg		
Total HpCDF	92	----	0.67		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	180	----	0.30				
Total HpCDD	400	----	0.30				
OCDF	95	----	0.83				
OCDD	1400	----	0.73				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	O-06				
Lab Sample ID	10487441028				
Filename	F190831A_11				
Injected By	JRH				
Total Amount Extracted	11.5 g	Matrix	Solid		
% Moisture	11.8	Dilution	NA		
Dry Weight Extracted	10.1 g	Collected	08/14/2019 07:30		
ICAL ID	F190827	Received	08/15/2019 08:40		
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05		
Method Blank ID	BLANK-72988	Analyzed	08/31/2019 12:08		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.50		2,3,7,8-TCDF-13C	2.00	70
Total TCDF	6.3	----	0.50		2,3,7,8-TCDD-13C	2.00	82
					1,2,3,7,8-PeCDF-13C	2.00	70
2,3,7,8-TCDD	ND	----	0.22		2,3,4,7,8-PeCDF-13C	2.00	71
Total TCDD	0.82	----	0.22	J	1,2,3,7,8-PeCDD-13C	2.00	83
					1,2,3,4,7,8-HxCDF-13C	2.00	79
1,2,3,7,8-PeCDF	ND	----	0.77		1,2,3,6,7,8-HxCDF-13C	2.00	82
2,3,4,7,8-PeCDF	1.0	----	0.51	J	2,3,4,6,7,8-HxCDF-13C	2.00	80
Total PeCDF	27	----	0.51		1,2,3,7,8,9-HxCDF-13C	2.00	67
					1,2,3,4,7,8-HxCDD-13C	2.00	86
1,2,3,7,8-PeCDD	----	0.38	0.31	U	1,2,3,6,7,8-HxCDD-13C	2.00	75
Total PeCDD	3.0	----	0.31	J	1,2,3,4,6,7,8-HpCDF-13C	2.00	72
					1,2,3,4,7,8,9-HpCDF-13C	2.00	70
1,2,3,4,7,8-HxCDF	2.3	----	0.54	J	1,2,3,4,6,7,8-HpCDD-13C	2.00	86
1,2,3,6,7,8-HxCDF	----	2.3	0.52	PJ	OCDD-13C	4.00	54
2,3,4,6,7,8-HxCDF	----	1.9	0.34	U			
1,2,3,7,8,9-HxCDF	ND	----	0.40		1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	40	----	0.34		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	0.95	----	0.66	J	2,3,7,8-TCDD-37Cl4	0.20	76
1,2,3,6,7,8-HxCDD	3.7	----	0.68	J			
1,2,3,7,8,9-HxCDD	2.3	----	0.32	J			
Total HxCDD	29	----	0.32				
1,2,3,4,6,7,8-HpCDF	37	----	0.38		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	----	1.7	0.33	U	Equivalence: 3.5 ng/Kg		
Total HpCDF	80	----	0.33		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	83	----	0.39				
Total HpCDD	160	----	0.39				
OCDF	58	----	0.99				
OCDD	680	----	0.86				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
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 NC = Not Calculated

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 J = Estimated value  
 P = PCDE Interference  
 I = Interference present

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	O-08				
Lab Sample ID	10487441029				
Filename	F190831A_12				
Injected By	JRH				
Total Amount Extracted	11.3 g	Matrix		Solid	
% Moisture	11.2	Dilution		NA	
Dry Weight Extracted	10.0 g	Collected		08/14/2019 07:45	
ICAL ID	F190827	Received		08/15/2019 08:40	
CCal Filename(s)	F190831A_01	Extracted		08/28/2019 15:05	
Method Blank ID	BLANK-72988	Analyzed		08/31/2019 12:54	

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.31		2,3,7,8-TCDF-13C	2.00	65
Total TCDF	1.7	----	0.31		2,3,7,8-TCDD-13C	2.00	78
					1,2,3,7,8-PeCDF-13C	2.00	67
2,3,7,8-TCDD	ND	----	0.20		2,3,4,7,8-PeCDF-13C	2.00	67
Total TCDD	0.81	----	0.20	J	1,2,3,7,8-PeCDD-13C	2.00	79
					1,2,3,4,7,8-HxCDF-13C	2.00	75
1,2,3,7,8-PeCDF	ND	----	0.42		1,2,3,6,7,8-HxCDF-13C	2.00	69
2,3,4,7,8-PeCDF	----	0.42	0.26	IJ	2,3,4,6,7,8-HxCDF-13C	2.00	67
Total PeCDF	9.2	----	0.26		1,2,3,7,8,9-HxCDF-13C	2.00	55
					1,2,3,4,7,8-HxCDD-13C	2.00	78
1,2,3,7,8-PeCDD	0.50	----	0.21	J	1,2,3,6,7,8-HxCDD-13C	2.00	66
Total PeCDD	1.8	----	0.21	J	1,2,3,4,6,7,8-HpCDF-13C	2.00	73
					1,2,3,4,7,8,9-HpCDF-13C	2.00	70
1,2,3,4,7,8-HxCDF	----	0.63	0.37	IJ	1,2,3,4,6,7,8-HpCDD-13C	2.00	86
1,2,3,6,7,8-HxCDF	----	0.97	0.33	PJ	OCDD-13C	4.00	54
2,3,4,6,7,8-HxCDF	0.62	----	0.40	J			
1,2,3,7,8,9-HxCDF	ND	----	0.14		1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	14	----	0.14		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	----	0.78	0.26	IJ	2,3,7,8-TCDD-37Cl4	0.20	72
1,2,3,6,7,8-HxCDD	----	1.3	0.24	IJ			
1,2,3,7,8,9-HxCDD	1.4	----	0.40	J			
Total HxCDD	14	----	0.24				
1,2,3,4,6,7,8-HpCDF	10	----	0.21		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	0.67	----	0.38	J	Equivalence: 1.7 ng/Kg		
Total HpCDF	27	----	0.21		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	32	----	0.15				
Total HpCDD	75	----	0.15				
OCDF	22	----	0.57				
OCDD	270	----	0.50				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

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 J = Estimated value  
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 I = Interference present

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	O-07				
Lab Sample ID	10487441030				
Filename	F190831A_13				
Injected By	JRH				
Total Amount Extracted	11.3 g	Matrix		Solid	
% Moisture	9.8	Dilution		NA	
Dry Weight Extracted	10.2 g	Collected		08/14/2019 08:00	
ICAL ID	F190827	Received		08/15/2019 08:40	
CCal Filename(s)	F190831A_01	Extracted		08/28/2019 15:05	
Method Blank ID	BLANK-73004	Analyzed		08/31/2019 13:40	

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.28	2,3,7,8-TCDF-13C	2.00	65
Total TCDF	0.61	----	0.28 J	2,3,7,8-TCDD-13C	2.00	76
				1,2,3,7,8-PeCDF-13C	2.00	65
2,3,7,8-TCDD	ND	----	0.14	2,3,4,7,8-PeCDF-13C	2.00	65
Total TCDD	0.36	----	0.14 J	1,2,3,7,8-PeCDD-13C	2.00	78
				1,2,3,4,7,8-HxCDF-13C	2.00	69
1,2,3,7,8-PeCDF	ND	----	0.38	1,2,3,6,7,8-HxCDF-13C	2.00	72
2,3,4,7,8-PeCDF	ND	----	0.19	2,3,4,6,7,8-HxCDF-13C	2.00	72
Total PeCDF	2.1	----	0.19 J	1,2,3,7,8,9-HxCDF-13C	2.00	69
				1,2,3,4,7,8-HxCDD-13C	2.00	73
1,2,3,7,8-PeCDD	ND	----	0.16	1,2,3,6,7,8-HxCDD-13C	2.00	70
Total PeCDD	ND	----	0.16	1,2,3,4,6,7,8-HpCDF-13C	2.00	75
				1,2,3,4,7,8,9-HpCDF-13C	2.00	75
1,2,3,4,7,8-HxCDF	0.35	----	0.29 J	1,2,3,4,6,7,8-HpCDD-13C	2.00	88
1,2,3,6,7,8-HxCDF	----	0.31	0.29 U	OCDD-13C	4.00	58
2,3,4,6,7,8-HxCDF	----	0.28	0.25 U			
1,2,3,7,8,9-HxCDF	ND	----	0.31	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	2.2	----	0.25 J	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	0.31	2,3,7,8-TCDD-37Cl4	0.20	71
1,2,3,6,7,8-HxCDD	0.65	----	0.42 J			
1,2,3,7,8,9-HxCDD	ND	----	0.36			
Total HxCDD	2.5	----	0.31 J			
1,2,3,4,6,7,8-HpCDF	4.2	----	0.25 J	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	0.22	Equivalence: 0.37 ng/Kg		
Total HpCDF	9.6	----	0.22	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	14	----	0.19			
Total HpCDD	25	----	0.19			
OCDF	8.4	----	0.53 J			
OCDD	100	----	0.51			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
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 I = Interference present

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	O-03			
Lab Sample ID	10487441031			
Filename	F190831A_14			
Injected By	JRH			
Total Amount Extracted	11.1 g	Matrix	Solid	
% Moisture	8.8	Dilution	NA	
Dry Weight Extracted	10.1 g	Collected	08/14/2019 08:15	
ICAL ID	F190827	Received	08/15/2019 08:40	
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05	
Method Blank ID	BLANK-73004	Analyzed	08/31/2019 14:26	

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.32	2,3,7,8-TCDF-13C	2.00	68
Total TCDF	16	----	0.32	2,3,7,8-TCDD-13C	2.00	84
				1,2,3,7,8-PeCDF-13C	2.00	70
2,3,7,8-TCDD	ND	----	0.22	2,3,4,7,8-PeCDF-13C	2.00	70
Total TCDD	3.2	----	0.22	1,2,3,7,8-PeCDD-13C	2.00	83
				1,2,3,4,7,8-HxCDF-13C	2.00	71
1,2,3,7,8-PeCDF	ND	----	0.72	1,2,3,6,7,8-HxCDF-13C	2.00	78
2,3,4,7,8-PeCDF	2.9	----	0.25 J	2,3,4,6,7,8-HxCDF-13C	2.00	69
Total PeCDF	72	----	0.25	1,2,3,7,8,9-HxCDF-13C	2.00	75
				1,2,3,4,7,8-HxCDD-13C	2.00	80
1,2,3,7,8-PeCDD	0.38	----	0.23 J	1,2,3,6,7,8-HxCDD-13C	2.00	71
Total PeCDD	6.6	----	0.23	1,2,3,4,6,7,8-HpCDF-13C	2.00	82
				1,2,3,4,7,8,9-HpCDF-13C	2.00	80
1,2,3,4,7,8-HxCDF	----	1.0	0.27 U	1,2,3,4,6,7,8-HpCDD-13C	2.00	100
1,2,3,6,7,8-HxCDF	0.70	----	0.18 J	OCDD-13C	4.00	63
2,3,4,6,7,8-HxCDF	2.7	----	0.17 J			
1,2,3,7,8,9-HxCDF	ND	----	0.15	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	27	----	0.15	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	----	0.49	0.25 U	2,3,7,8-TCDD-37Cl4	0.20	78
1,2,3,6,7,8-HxCDD	1.7	----	0.21 J			
1,2,3,7,8,9-HxCDD	1.1	----	0.28 J			
Total HxCDD	24	----	0.21			
1,2,3,4,6,7,8-HpCDF	15	----	0.091	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	----	0.56	0.26 U	Equivalence: 2.6 ng/Kg		
Total HpCDF	31	----	0.091	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	33	----	0.053			
Total HpCDD	79	----	0.053			
OCDF	25	----	0.31			
OCDD	260	----	0.30			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
J = Estimated value  
I = Interference present

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	O-02		
Lab Sample ID	10487441032		
Filename	F190831A_15		
Injected By	JRH		
Total Amount Extracted	12.0 g	Matrix	Solid
% Moisture	11.1	Dilution	NA
Dry Weight Extracted	10.7 g	Collected	08/14/2019 08:25
ICAL ID	F190827	Received	08/15/2019 08:40
CCal Filename(s)	F190831A_01	Extracted	08/28/2019 15:05
Method Blank ID	BLANK-73004	Analyzed	08/31/2019 15:12

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.27	2,3,7,8-TCDF-13C	2.00	66
Total TCDF	2.9	----	0.27	2,3,7,8-TCDD-13C	2.00	79
				1,2,3,7,8-PeCDF-13C	2.00	65
2,3,7,8-TCDD	ND	----	0.19	2,3,4,7,8-PeCDF-13C	2.00	64
Total TCDD	ND	----	0.19	1,2,3,7,8-PeCDD-13C	2.00	76
				1,2,3,4,7,8-HxCDF-13C	2.00	72
1,2,3,7,8-PeCDF	ND	----	0.35	1,2,3,6,7,8-HxCDF-13C	2.00	76
2,3,4,7,8-PeCDF	0.89	----	0.16 J	2,3,4,6,7,8-HxCDF-13C	2.00	71
Total PeCDF	20	----	0.16	1,2,3,7,8,9-HxCDF-13C	2.00	69
				1,2,3,4,7,8-HxCDD-13C	2.00	74
1,2,3,7,8-PeCDD	ND	----	0.26	1,2,3,6,7,8-HxCDD-13C	2.00	74
Total PeCDD	0.69	----	0.26 J	1,2,3,4,6,7,8-HpCDF-13C	2.00	76
				1,2,3,4,7,8,9-HpCDF-13C	2.00	78
1,2,3,4,7,8-HxCDF	0.97	----	0.28 J	1,2,3,4,6,7,8-HpCDD-13C	2.00	93
1,2,3,6,7,8-HxCDF	----	0.89	0.37 U	OCDD-13C	4.00	61
2,3,4,6,7,8-HxCDF	1.5	----	0.31 J			
1,2,3,7,8,9-HxCDF	ND	----	0.23	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	12	----	0.23	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	0.45	----	0.40 J	2,3,7,8-TCDD-37Cl4	0.20	72
1,2,3,6,7,8-HxCDD	1.2	----	0.34 J			
1,2,3,7,8,9-HxCDD	1.2	----	0.42 J			
Total HxCDD	12	----	0.34			
1,2,3,4,6,7,8-HpCDF	9.6	----	0.21	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	----	0.48	0.26 U	Equivalence: 1.3 ng/Kg		
Total HpCDF	19	----	0.21	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	22	----	0.100			
Total HpCDD	50	----	0.100			
OCDF	17	----	0.41			
OCDD	160	----	0.23			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

ND = Not Detected  
 NA = Not Applicable  
 NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N4-3				
Lab Sample ID	10487441033				
Filename	Y190830B_11				
Injected By	JRH				
Total Amount Extracted	11.2 g		Matrix	Solid	
% Moisture	8.9		Dilution	NA	
Dry Weight Extracted	10.2 g		Collected	08/14/2019 09:00	
ICAL ID	Y190827		Received	08/15/2019 08:40	
CCal Filename(s)	Y190830A_18		Extracted	08/28/2019 15:05	
Method Blank ID	BLANK-73004		Analyzed	08/31/2019 06:12	

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	2.4	----	0.13		2,3,7,8-TCDF-13C	2.00	63
Total TCDF	140	----	0.13	E	2,3,7,8-TCDD-13C	2.00	66
					1,2,3,7,8-PeCDF-13C	2.00	70
2,3,7,8-TCDD	1.0	----	0.15		2,3,4,7,8-PeCDF-13C	2.00	70
Total TCDD	12	----	0.15		1,2,3,7,8-PeCDD-13C	2.00	76
					1,2,3,4,7,8-HxCDF-13C	2.00	88 DN2
1,2,3,7,8-PeCDF	3.4	----	0.32	J	1,2,3,6,7,8-HxCDF-13C	2.00	83 DN2
2,3,4,7,8-PeCDF	61	----	1.0		2,3,4,6,7,8-HxCDF-13C	2.00	81 DN2
Total PeCDF	760	----	0.32		1,2,3,7,8,9-HxCDF-13C	2.00	41 DN2
					1,2,3,4,7,8-HxCDD-13C	2.00	90 DN2
1,2,3,7,8-PeCDD	5.9	----	0.13		1,2,3,6,7,8-HxCDD-13C	2.00	74 DN2
Total PeCDD	33	----	0.13		1,2,3,4,6,7,8-HpCDF-13C	2.00	70 DN2
					1,2,3,4,7,8,9-HpCDF-13C	2.00	79 DN2
1,2,3,4,7,8-HxCDF	----	75	0.73	PDN2	1,2,3,4,6,7,8-HpCDD-13C	2.00	81 DN2
1,2,3,6,7,8-HxCDF	----	28	0.91	PDN2	OCDD-13C	4.00	84 DN2
2,3,4,6,7,8-HxCDF	30	----	0.77	DN2			
1,2,3,7,8,9-HxCDF	6.1	----	0.65	JDN2	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	1200	----	0.65	DN2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	9.0	----	1.1	JDN2	2,3,7,8-TCDD-37Cl4	0.20	77
1,2,3,6,7,8-HxCDD	44	----	1.2	DN2			
1,2,3,7,8,9-HxCDD	15	----	1.1	JDN2			
Total HxCDD	310	----	1.1	DN2			
1,2,3,4,6,7,8-HpCDF	380	----	0.72	DN2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	20	----	0.55	JDN2	Equivalence: 62 ng/Kg		
Total HpCDF	1100	----	0.55	DN2	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	930	----	1.7	DN2			
Total HpCDD	1900	----	1.7	DN2			
OCDF	620	----	0.40	DN2			
OCDD	9200	----	0.48	DN2			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

J = Estimated value  
P = PCDE Interference  
E = Exceeds calibration range  
D = Result obtained from analysis of diluted sample  
Nn = Value obtained from additional analysis

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N4-2				
Lab Sample ID	10487441034				
Filename	Y190830B_12				
Injected By	JRH				
Total Amount Extracted	11.5 g		Matrix	Solid	
% Moisture	12.0		Dilution	NA	
Dry Weight Extracted	10.1 g		Collected	08/14/2019 09:15	
ICAL ID	Y190827		Received	08/15/2019 08:40	
CCal Filename(s)	Y190830A_18		Extracted	08/28/2019 15:05	
Method Blank ID	BLANK-73004		Analyzed	08/31/2019 06:58	

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	4.4	----	0.98	C	2,3,7,8-TCDF-13C	2.00	81
Total TCDF	99	----	0.66		2,3,7,8-TCDD-13C	2.00	87
					1,2,3,7,8-PeCDF-13C	2.00	89
2,3,7,8-TCDD	0.85	----	0.59	J	2,3,4,7,8-PeCDF-13C	2.00	99
Total TCDD	18	----	0.59		1,2,3,7,8-PeCDD-13C	2.00	104
					1,2,3,4,7,8-HxCDF-13C	2.00	89 DN2
1,2,3,7,8-PeCDF	----	270	0.85	P	1,2,3,6,7,8-HxCDF-13C	2.00	80 DN2
2,3,4,7,8-PeCDF	14	----	0.56		2,3,4,6,7,8-HxCDF-13C	2.00	84 DN2
Total PeCDF	480	----	0.56		1,2,3,7,8,9-HxCDF-13C	2.00	46 DN2
					1,2,3,4,7,8-HxCDD-13C	2.00	86 DN2
1,2,3,7,8-PeCDD	5.2	----	0.51		1,2,3,6,7,8-HxCDD-13C	2.00	68 DN2
Total PeCDD	25	----	0.51		1,2,3,4,6,7,8-HpCDF-13C	2.00	64 DN2
					1,2,3,4,7,8,9-HpCDF-13C	2.00	70 DN2
1,2,3,4,7,8-HxCDF	16	----	0.68	JDN2	1,2,3,4,6,7,8-HpCDD-13C	2.00	70 DN2
1,2,3,6,7,8-HxCDF	20	----	0.49	JDN2	OCDD-13C	4.00	74 DN2
2,3,4,6,7,8-HxCDF	16	----	0.45	JDN2			
1,2,3,7,8,9-HxCDF	6.7	----	0.91	JDN2	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	430	----	0.45	DN2	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	7.8	----	0.71	JDN2	2,3,7,8-TCDD-37Cl4	0.20	101
1,2,3,6,7,8-HxCDD	39	----	0.61	DN2			
1,2,3,7,8,9-HxCDD	15	----	0.70	JDN2			
Total HxCDD	260	----	0.61	DN2			
1,2,3,4,6,7,8-HpCDF	250	----	0.57	DN2	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	14	----	0.67	JDN2	Equivalence: 44 ng/Kg		
Total HpCDF	610	----	0.57	DN2	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	820	----	1.3	DN2			
Total HpCDD	1600	----	1.3	DN2			
OCDF	490	----	0.53	DN2			
OCDD	7300	----	0.57	DN2			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

J = Estimated value  
P = PCDE Interference  
D = Result obtained from analysis of diluted sample  
Nn = Value obtained from additional analysis  
C = Result obtained from confirmation analysis

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N4-1				
Lab Sample ID	10487441035				
Filename	Y190830B_13				
Injected By	JRH				
Total Amount Extracted	11.5 g	Matrix	Solid		
% Moisture	8.7	Dilution	NA		
Dry Weight Extracted	10.5 g	Collected	08/14/2019 09:25		
ICAL ID	Y190827	Received	08/15/2019 08:40		
CCal Filename(s)	Y190830A_18	Extracted	08/28/2019 15:05		
Method Blank ID	BLANK-73004	Analyzed	08/31/2019 07:43		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	2.1	----	0.31		2,3,7,8-TCDF-13C	2.00	84
Total TCDF	58	----	0.31		2,3,7,8-TCDD-13C	2.00	82
					1,2,3,7,8-PeCDF-13C	2.00	84
2,3,7,8-TCDD	0.80	----	0.37	J	2,3,4,7,8-PeCDF-13C	2.00	85
Total TCDD	11	----	0.37		1,2,3,7,8-PeCDD-13C	2.00	92
					1,2,3,4,7,8-HxCDF-13C	2.00	97
1,2,3,7,8-PeCDF	2.1	----	0.26	J	1,2,3,6,7,8-HxCDF-13C	2.00	93
2,3,4,7,8-PeCDF	11	----	0.34		2,3,4,6,7,8-HxCDF-13C	2.00	90
Total PeCDF	180	----	0.26		1,2,3,7,8,9-HxCDF-13C	2.00	61
					1,2,3,4,7,8-HxCDD-13C	2.00	86
1,2,3,7,8-PeCDD	2.5	----	0.34	J	1,2,3,6,7,8-HxCDD-13C	2.00	71
Total PeCDD	22	----	0.34		1,2,3,4,6,7,8-HpCDF-13C	2.00	52
					1,2,3,4,7,8,9-HpCDF-13C	2.00	43
1,2,3,4,7,8-HxCDF	8.2	----	0.16		1,2,3,4,6,7,8-HpCDD-13C	2.00	48
1,2,3,6,7,8-HxCDF	8.0	----	0.21		OCDD-13C	4.00	28
2,3,4,6,7,8-HxCDF	6.5	----	0.13				
1,2,3,7,8,9-HxCDF	3.0	----	0.11	J	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	200	----	0.11		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	6.3	----	0.38		2,3,7,8-TCDD-37Cl4	0.20	80
1,2,3,6,7,8-HxCDD	24	----	0.14				
1,2,3,7,8,9-HxCDD	12	----	0.12				
Total HxCDD	170	----	0.12				
1,2,3,4,6,7,8-HpCDF	150	----	0.39		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	9.4	----	0.38		Equivalence: 22 ng/Kg		
Total HpCDF	380	----	0.38		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	530	----	0.31				
Total HpCDD	1000	----	0.31				
OCDF	320	----	0.68				
OCDD	5100	----	0.91				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
J = Estimated value

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### Method 1613B Sample Analysis Results

Client - TRC-WI

Client's Sample ID	N7-1				
Lab Sample ID	10487441036				
Filename	Y190830B_14				
Injected By	JRH				
Total Amount Extracted	11.1 g	Matrix	Solid		
% Moisture	8.2	Dilution	NA		
Dry Weight Extracted	10.2 g	Collected	08/14/2019 08:45		
ICAL ID	Y190827	Received	08/15/2019 08:40		
CCal Filename(s)	Y190830A_18	Extracted	08/28/2019 15:05		
Method Blank ID	BLANK-73004	Analyzed	08/31/2019 08:29		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg		Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	----	0.55	0.16	U	2,3,7,8-TCDF-13C	2.00	83
Total TCDF	21	----	0.16		2,3,7,8-TCDD-13C	2.00	81
					1,2,3,7,8-PeCDF-13C	2.00	83
2,3,7,8-TCDD	0.26	----	0.23	J	2,3,4,7,8-PeCDF-13C	2.00	85
Total TCDD	2.3	----	0.23		1,2,3,7,8-PeCDD-13C	2.00	88
					1,2,3,4,7,8-HxCDF-13C	2.00	84
1,2,3,7,8-PeCDF	0.69	----	0.11	J	1,2,3,6,7,8-HxCDF-13C	2.00	77
2,3,4,7,8-PeCDF	4.1	----	0.15	J	2,3,4,6,7,8-HxCDF-13C	2.00	80
Total PeCDF	50	----	0.11		1,2,3,7,8,9-HxCDF-13C	2.00	50
					1,2,3,4,7,8-HxCDD-13C	2.00	82
1,2,3,7,8-PeCDD	0.91	----	0.25	J	1,2,3,6,7,8-HxCDD-13C	2.00	68
Total PeCDD	7.6	----	0.25		1,2,3,4,6,7,8-HpCDF-13C	2.00	63
					1,2,3,4,7,8,9-HpCDF-13C	2.00	59
1,2,3,4,7,8-HxCDF	----	3.6	0.12	PJ	1,2,3,4,6,7,8-HpCDD-13C	2.00	58
1,2,3,6,7,8-HxCDF	2.7	----	0.14	J	OCDD-13C	4.00	36
2,3,4,6,7,8-HxCDF	2.4	----	0.12	J			
1,2,3,7,8,9-HxCDF	0.80	----	0.100	J	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	87	----	0.100		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	2.2	----	0.077	J	2,3,7,8-TCDD-37Cl4	0.20	82
1,2,3,6,7,8-HxCDD	6.1	----	0.078				
1,2,3,7,8,9-HxCDD	3.4	----	0.077	J			
Total HxCDD	56	----	0.077				
1,2,3,4,6,7,8-HpCDF	46	----	0.14		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	2.3	----	0.23	J	Equivalence: 7.0 ng/Kg		
Total HpCDF	100	----	0.14		(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	150	----	0.10				
Total HpCDD	330	----	0.10				
OCDF	71	----	0.36				
OCDD	1300	----	0.22				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

ND = Not Detected  
NA = Not Applicable  
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.  
J = Estimated value  
P = PCDE Interference  
I = Interference present

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**Method 1613B Blank Analysis Results**

Lab Sample Name	DFBLKWU	Matrix	Solid
Lab Sample ID	BLANK-72962	Dilution	NA
Filename	F190829A_12	Extracted	08/27/2019 15:05
Total Amount Extracted	10.7 g	Analyzed	08/29/2019 16:25
ICAL ID	F190827	Injected By	SMT
CCal Filename(s)	F190829A_01		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.072	2,3,7,8-TCDF-13C	2.00	84
Total TCDF	ND	----	0.072	2,3,7,8-TCDD-13C	2.00	81
				1,2,3,7,8-PeCDF-13C	2.00	79
2,3,7,8-TCDD	ND	----	0.079	2,3,4,7,8-PeCDF-13C	2.00	82
Total TCDD	ND	----	0.079	1,2,3,7,8-PeCDD-13C	2.00	79
				1,2,3,4,7,8-HxCDF-13C	2.00	78
1,2,3,7,8-PeCDF	ND	----	0.10	1,2,3,6,7,8-HxCDF-13C	2.00	87
2,3,4,7,8-PeCDF	ND	----	0.061	2,3,4,6,7,8-HxCDF-13C	2.00	86
Total PeCDF	ND	----	0.061	1,2,3,7,8,9-HxCDF-13C	2.00	86
				1,2,3,4,7,8-HxCDD-13C	2.00	68
1,2,3,7,8-PeCDD	ND	----	0.10	1,2,3,6,7,8-HxCDD-13C	2.00	76
Total PeCDD	ND	----	0.10	1,2,3,4,6,7,8-HpCDF-13C	2.00	76
				1,2,3,4,7,8,9-HpCDF-13C	2.00	72
1,2,3,4,7,8-HxCDF	ND	----	0.079	1,2,3,4,6,7,8-HpCDD-13C	2.00	76
1,2,3,6,7,8-HxCDF	ND	----	0.070	OCDD-13C	4.00	57
2,3,4,6,7,8-HxCDF	ND	----	0.065			
1,2,3,7,8,9-HxCDF	ND	----	0.060	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	----	0.060	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	0.093	----	0.076 J	2,3,7,8-TCDD-37Cl4	0.20	76
1,2,3,6,7,8-HxCDD	ND	----	0.086			
1,2,3,7,8,9-HxCDD	ND	----	0.096			
Total HxCDD	0.093	----	0.076 J			
1,2,3,4,6,7,8-HpCDF	ND	----	0.084	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	0.097	Equivalence: 0.010 ng/Kg		
Total HpCDF	ND	----	0.084	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	----	0.13			
Total HpCDD	0.28	----	0.13 J			
OCDF	----	0.27	0.15 J			
OCDD	2.3	----	0.11 J			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).

EMPC = Estimated Maximum Possible Concentration

EDL = Estimated Detection Limit

Results reported on a total weight basis and are valid to no more than 2 significant figures.

J = Estimated value

I = Interference present

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### Method 1613B Blank Analysis Results

Lab Sample Name	DFBLKWZ	Matrix	Solid
Lab Sample ID	BLANK-72988	Dilution	NA
Filename	F190830A_06	Extracted	08/28/2019 15:05
Total Amount Extracted	10.1 g	Analyzed	08/30/2019 13:45
ICAL ID	F190827	Injected By	ZMS
CCal Filename(s)	F190830A_03		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.065	2,3,7,8-TCDF-13C	2.00	91
Total TCDF	ND	----	0.065	2,3,7,8-TCDD-13C	2.00	88
				1,2,3,7,8-PeCDF-13C	2.00	89
2,3,7,8-TCDD	ND	----	0.10	2,3,4,7,8-PeCDF-13C	2.00	87
Total TCDD	0.13	----	0.10 J	1,2,3,7,8-PeCDD-13C	2.00	89
				1,2,3,4,7,8-HxCDF-13C	2.00	92
1,2,3,7,8-PeCDF	ND	----	0.14	1,2,3,6,7,8-HxCDF-13C	2.00	105
2,3,4,7,8-PeCDF	0.11	----	0.089 J	2,3,4,6,7,8-HxCDF-13C	2.00	102
Total PeCDF	0.11	----	0.089 J	1,2,3,7,8,9-HxCDF-13C	2.00	100
				1,2,3,4,7,8-HxCDD-13C	2.00	83
1,2,3,7,8-PeCDD	ND	----	0.079	1,2,3,6,7,8-HxCDD-13C	2.00	84
Total PeCDD	ND	----	0.079	1,2,3,4,6,7,8-HpCDF-13C	2.00	100
				1,2,3,4,7,8,9-HpCDF-13C	2.00	96
1,2,3,4,7,8-HxCDF	0.077	----	0.066 J	1,2,3,4,6,7,8-HpCDD-13C	2.00	98
1,2,3,6,7,8-HxCDF	0.076	----	0.057 J	OCDD-13C	4.00	84
2,3,4,6,7,8-HxCDF	----	0.059	0.054 U			
1,2,3,7,8,9-HxCDF	0.10	----	0.076 J	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	0.25	----	0.054 J	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	0.11	2,3,7,8-TCDD-37Cl4	0.20	74
1,2,3,6,7,8-HxCDD	ND	----	0.12			
1,2,3,7,8,9-HxCDD	ND	----	0.15			
Total HxCDD	ND	----	0.11			
1,2,3,4,6,7,8-HpCDF	----	0.069	0.054 U	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	0.095	----	0.067 J	Equivalence: 0.070 ng/Kg		
Total HpCDF	0.095	----	0.054 J	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	0.25	----	0.12 J			
Total HpCDD	0.53	----	0.12 J			
OCDF	0.20	----	0.10 J			
OCDD	1.3	----	0.17 J			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
 EMPC = Estimated Maximum Possible Concentration  
 EDL = Estimated Detection Limit

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**Method 1613B Blank Analysis Results**

Lab Sample Name	DFBLKXD	Matrix	Solid
Lab Sample ID	BLANK-73004	Dilution	NA
Filename	F190830B_07	Extracted	08/28/2019 15:05
Total Amount Extracted	20.7 g	Analyzed	08/30/2019 21:33
ICAL ID	F190827	Injected By	JRH
CCal Filename(s)	F190830A_09		

Native Isomers	Conc ng/Kg	EMPC ng/Kg	EDL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	----	0.048	2,3,7,8-TCDF-13C	2.00	65
Total TCDF	ND	----	0.048	2,3,7,8-TCDD-13C	2.00	75
				1,2,3,7,8-PeCDF-13C	2.00	71
2,3,7,8-TCDD	ND	----	0.054	2,3,4,7,8-PeCDF-13C	2.00	75
Total TCDD	ND	----	0.054	1,2,3,7,8-PeCDD-13C	2.00	82
				1,2,3,4,7,8-HxCDF-13C	2.00	73
1,2,3,7,8-PeCDF	ND	----	0.079	1,2,3,6,7,8-HxCDF-13C	2.00	79
2,3,4,7,8-PeCDF	ND	----	0.049	2,3,4,6,7,8-HxCDF-13C	2.00	77
Total PeCDF	ND	----	0.049	1,2,3,7,8,9-HxCDF-13C	2.00	78
				1,2,3,4,7,8-HxCDD-13C	2.00	70
1,2,3,7,8-PeCDD	ND	----	0.060	1,2,3,6,7,8-HxCDD-13C	2.00	69
Total PeCDD	ND	----	0.060	1,2,3,4,6,7,8-HpCDF-13C	2.00	82
				1,2,3,4,7,8,9-HpCDF-13C	2.00	85
1,2,3,4,7,8-HxCDF	ND	----	0.036	1,2,3,4,6,7,8-HpCDD-13C	2.00	90
1,2,3,6,7,8-HxCDF	ND	----	0.033	OCDD-13C	4.00	79
2,3,4,6,7,8-HxCDF	ND	----	0.039			
1,2,3,7,8,9-HxCDF	ND	----	0.047	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	----	0.033	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	----	0.069	2,3,7,8-TCDD-37Cl4	0.20	72
1,2,3,6,7,8-HxCDD	ND	----	0.074			
1,2,3,7,8,9-HxCDD	ND	----	0.063			
Total HxCDD	ND	----	0.063			
1,2,3,4,6,7,8-HpCDF	----	0.026	0.026 U	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	----	0.029	Equivalence: 0.0015 ng/Kg		
Total HpCDF	0.052	----	0.026 J	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	0.098	----	0.043 J			
Total HpCDD	0.098	----	0.043 J			
OCDF	----	0.098	0.063 U			
OCDD	0.62	----	0.095 J			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).  
EMPC = Estimated Maximum Possible Concentration  
EDL = Estimated Detection Limit

Results reported on a total weight basis and are valid to no more than 2 significant figures.

J = Estimated value  
I = Interference present

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### Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCS-72963	Matrix	Solid
Filename	F190829A_10	Dilution	NA
Total Amount Extracted	10.8 g	Extracted	08/27/2019 15:05
ICAL ID	F190827	Analyzed	08/29/2019 14:53
CCal Filename	F190829A_01	Injected By	SMT
Method Blank ID	BLANK-72962		

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	11	7.5	15.8	106
2,3,7,8-TCDD	10	11	6.7	15.8	106
1,2,3,7,8-PeCDF	50	52	40.0	67.0	104
2,3,4,7,8-PeCDF	50	52	34.0	80.0	105
1,2,3,7,8-PeCDD	50	46	35.0	71.0	92
1,2,3,4,7,8-HxCDF	50	55	36.0	67.0	110
1,2,3,6,7,8-HxCDF	50	52	42.0	65.0	104
2,3,4,6,7,8-HxCDF	50	52	35.0	78.0	105
1,2,3,7,8,9-HxCDF	50	50	39.0	65.0	100
1,2,3,4,7,8-HxCDD	50	54	35.0	82.0	108
1,2,3,6,7,8-HxCDD	50	54	38.0	67.0	109
1,2,3,7,8,9-HxCDD	50	57	32.0	81.0	113
1,2,3,4,6,7,8-HpCDF	50	53	41.0	61.0	106
1,2,3,4,7,8,9-HpCDF	50	47	39.0	69.0	94
1,2,3,4,6,7,8-HpCDD	50	48	35.0	70.0	97
OCDF	100	120	63.0	170.0	116
OCDD	100	110	78.0	144.0	107
2,3,7,8-TCDD-37Cl4	10	8.9	3.1	19.1	89
2,3,7,8-TCDF-13C	100	96	22.0	152.0	96
2,3,7,8-TCDD-13C	100	92	20.0	175.0	92
1,2,3,7,8-PeCDF-13C	100	90	21.0	192.0	90
2,3,4,7,8-PeCDF-13C	100	94	13.0	328.0	94
1,2,3,7,8-PeCDD-13C	100	93	21.0	227.0	93
1,2,3,4,7,8-HxCDF-13C	100	91	19.0	202.0	91
1,2,3,6,7,8-HxCDF-13C	100	110	21.0	159.0	105
2,3,4,6,7,8-HxCDF-13C	100	92	22.0	176.0	92
1,2,3,7,8,9-HxCDF-13C	100	94	17.0	205.0	94
1,2,3,4,7,8-HxCDD-13C	100	76	21.0	193.0	76
1,2,3,6,7,8-HxCDD-13C	100	84	25.0	163.0	84
1,2,3,4,6,7,8-HpCDF-13C	100	85	21.0	158.0	85
1,2,3,4,7,8,9-HpCDF-13C	100	86	20.0	186.0	86
1,2,3,4,6,7,8-HpCDD-13C	100	88	26.0	166.0	88
OCDD-13C	200	150	26.0	397.0	73

Cs = Concentration Spiked (ng/mL)  
 Cr = Concentration Recovered (ng/mL)  
 Rec. = Recovery (Expressed as Percent)  
 Control Limit Reference: Method 1613, Table 6, 10/94 Revision  
 R = Recovery outside of control limits  
 Nn = Value obtained from additional analysis  
 \* = See Discussion

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### Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCS-72989	Matrix	Solid
Filename	F190830A_04	Dilution	NA
Total Amount Extracted	10.4 g	Extracted	08/28/2019 15:05
ICAL ID	F190827	Analyzed	08/30/2019 12:14
CCal Filename	F190830A_03	Injected By	ZMS
Method Blank ID	BLANK-72988		

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	9.6	7.5	15.8	96
2,3,7,8-TCDD	10	10	6.7	15.8	101
1,2,3,7,8-PeCDF	50	48	40.0	67.0	96
2,3,4,7,8-PeCDF	50	49	34.0	80.0	98
1,2,3,7,8-PeCDD	50	43	35.0	71.0	86
1,2,3,4,7,8-HxCDF	50	51	36.0	67.0	102
1,2,3,6,7,8-HxCDF	50	49	42.0	65.0	99
2,3,4,6,7,8-HxCDF	50	49	35.0	78.0	98
1,2,3,7,8,9-HxCDF	50	48	39.0	65.0	96
1,2,3,4,7,8-HxCDD	50	50	35.0	82.0	99
1,2,3,6,7,8-HxCDD	50	52	38.0	67.0	103
1,2,3,7,8,9-HxCDD	50	51	32.0	81.0	103
1,2,3,4,6,7,8-HpCDF	50	47	41.0	61.0	93
1,2,3,4,7,8,9-HpCDF	50	44	39.0	69.0	89
1,2,3,4,6,7,8-HpCDD	50	43	35.0	70.0	86
OCDF	100	100	63.0	170.0	102
OCDD	100	97	78.0	144.0	97
2,3,7,8-TCDD-37Cl4	10	7.9	3.1	19.1	79
2,3,7,8-TCDF-13C	100	90	22.0	152.0	90
2,3,7,8-TCDD-13C	100	90	20.0	175.0	90
1,2,3,7,8-PeCDF-13C	100	86	21.0	192.0	86
2,3,4,7,8-PeCDF-13C	100	87	13.0	328.0	87
1,2,3,7,8-PeCDD-13C	100	88	21.0	227.0	88
1,2,3,4,7,8-HxCDF-13C	100	92	19.0	202.0	92
1,2,3,6,7,8-HxCDF-13C	100	99	21.0	159.0	99
2,3,4,6,7,8-HxCDF-13C	100	96	22.0	176.0	96
1,2,3,7,8,9-HxCDF-13C	100	92	17.0	205.0	92
1,2,3,4,7,8-HxCDD-13C	100	83	21.0	193.0	83
1,2,3,6,7,8-HxCDD-13C	100	84	25.0	163.0	84
1,2,3,4,6,7,8-HpCDF-13C	100	95	21.0	158.0	95
1,2,3,4,7,8,9-HpCDF-13C	100	96	20.0	186.0	96
1,2,3,4,6,7,8-HpCDD-13C	100	97	26.0	166.0	97
OCDD-13C	200	170	26.0	397.0	84

Cs = Concentration Spiked (ng/mL)  
 Cr = Concentration Recovered (ng/mL)  
 Rec. = Recovery (Expressed as Percent)  
 Control Limit Reference: Method 1613, Table 6, 10/94 Revision  
 R = Recovery outside of control limits  
 Nn = Value obtained from additional analysis  
 \* = See Discussion

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### Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCS-73005	Matrix	Solid
Filename	F190830B_03	Dilution	NA
Total Amount Extracted	20.4 g	Extracted	08/28/2019 15:05
ICAL ID	F190827	Analyzed	08/30/2019 18:29
CCal Filename	F190830A_09	Injected By	JRH
Method Blank ID	BLANK-73004		

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	10	7.5	15.8	103
2,3,7,8-TCDD	10	11	6.7	15.8	110
1,2,3,7,8-PeCDF	50	53	40.0	67.0	107
2,3,4,7,8-PeCDF	50	56	34.0	80.0	112
1,2,3,7,8-PeCDD	50	50	35.0	71.0	100
1,2,3,4,7,8-HxCDF	50	59	36.0	67.0	119
1,2,3,6,7,8-HxCDF	50	54	42.0	65.0	108
2,3,4,6,7,8-HxCDF	50	53	35.0	78.0	106
1,2,3,7,8,9-HxCDF	50	52	39.0	65.0	104
1,2,3,4,7,8-HxCDD	50	57	35.0	82.0	115
1,2,3,6,7,8-HxCDD	50	59	38.0	67.0	117
1,2,3,7,8,9-HxCDD	50	60	32.0	81.0	120
1,2,3,4,6,7,8-HpCDF	50	54	41.0	61.0	109
1,2,3,4,7,8,9-HpCDF	50	51	39.0	69.0	103
1,2,3,4,6,7,8-HpCDD	50	52	35.0	70.0	104
OCDF	100	110	63.0	170.0	115
OCDD	100	110	78.0	144.0	113
2,3,7,8-TCDD-37Cl4	10	8.7	3.1	19.1	87
2,3,7,8-TCDF-13C	100	83	22.0	152.0	83
2,3,7,8-TCDD-13C	100	84	20.0	175.0	84
1,2,3,7,8-PeCDF-13C	100	83	21.0	192.0	83
2,3,4,7,8-PeCDF-13C	100	82	13.0	328.0	82
1,2,3,7,8-PeCDD-13C	100	85	21.0	227.0	85
1,2,3,4,7,8-HxCDF-13C	100	82	19.0	202.0	82
1,2,3,6,7,8-HxCDF-13C	100	90	21.0	159.0	90
2,3,4,6,7,8-HxCDF-13C	100	87	22.0	176.0	87
1,2,3,7,8,9-HxCDF-13C	100	89	17.0	205.0	89
1,2,3,4,7,8-HxCDD-13C	100	75	21.0	193.0	75
1,2,3,6,7,8-HxCDD-13C	100	77	25.0	163.0	77
1,2,3,4,6,7,8-HpCDF-13C	100	88	21.0	158.0	88
1,2,3,4,7,8,9-HpCDF-13C	100	91	20.0	186.0	91
1,2,3,4,6,7,8-HpCDD-13C	100	94	26.0	166.0	94
OCDD-13C	200	170	26.0	397.0	86

Cs = Concentration Spiked (ng/mL)  
 Cr = Concentration Recovered (ng/mL)  
 Rec. = Recovery (Expressed as Percent)  
 Control Limit Reference: Method 1613, Table 6, 10/94 Revision  
 R = Recovery outside of control limits  
 Nn = Value obtained from additional analysis  
 \* = See Discussion

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### Method 1613B Laboratory Control Spike Results

Lab Sample ID	LCSD-73008	Matrix	Solid
Filename	F190830B_04	Dilution	NA
Total Amount Extracted	20.1 g	Extracted	08/28/2019 15:05
ICAL ID	F190827	Analyzed	08/30/2019 19:15
CCal Filename	F190830A_09	Injected By	JRH
Method Blank ID	BLANK-73004		

Compound	Cs	Cr	Lower Limit	Upper Limit	% Rec.
2,3,7,8-TCDF	10	11	7.5	15.8	109
2,3,7,8-TCDD	10	11	6.7	15.8	109
1,2,3,7,8-PeCDF	50	52	40.0	67.0	104
2,3,4,7,8-PeCDF	50	55	34.0	80.0	109
1,2,3,7,8-PeCDD	50	48	35.0	71.0	96
1,2,3,4,7,8-HxCDF	50	60	36.0	67.0	119
1,2,3,6,7,8-HxCDF	50	53	42.0	65.0	107
2,3,4,6,7,8-HxCDF	50	52	35.0	78.0	104
1,2,3,7,8,9-HxCDF	50	52	39.0	65.0	103
1,2,3,4,7,8-HxCDD	50	57	35.0	82.0	113
1,2,3,6,7,8-HxCDD	50	58	38.0	67.0	116
1,2,3,7,8,9-HxCDD	50	59	32.0	81.0	119
1,2,3,4,6,7,8-HpCDF	50	55	41.0	61.0	110
1,2,3,4,7,8,9-HpCDF	50	50	39.0	69.0	101
1,2,3,4,6,7,8-HpCDD	50	51	35.0	70.0	102
OCDF	100	120	63.0	170.0	117
OCDD	100	120	78.0	144.0	119
2,3,7,8-TCDD-37Cl4	10	7.7	3.1	19.1	77
2,3,7,8-TCDF-13C	100	74	22.0	152.0	74
2,3,7,8-TCDD-13C	100	80	20.0	175.0	80
1,2,3,7,8-PeCDF-13C	100	75	21.0	192.0	75
2,3,4,7,8-PeCDF-13C	100	77	13.0	328.0	77
1,2,3,7,8-PeCDD-13C	100	83	21.0	227.0	83
1,2,3,4,7,8-HxCDF-13C	100	78	19.0	202.0	78
1,2,3,6,7,8-HxCDF-13C	100	84	21.0	159.0	84
2,3,4,6,7,8-HxCDF-13C	100	80	22.0	176.0	80
1,2,3,7,8,9-HxCDF-13C	100	79	17.0	205.0	79
1,2,3,4,7,8-HxCDD-13C	100	73	21.0	193.0	73
1,2,3,6,7,8-HxCDD-13C	100	71	25.0	163.0	71
1,2,3,4,6,7,8-HpCDF-13C	100	84	21.0	158.0	84
1,2,3,4,7,8,9-HpCDF-13C	100	89	20.0	186.0	89
1,2,3,4,6,7,8-HpCDD-13C	100	92	26.0	166.0	92
OCDD-13C	200	150	26.0	397.0	77

Cs = Concentration Spiked (ng/mL)  
 Cr = Concentration Recovered (ng/mL)  
 Rec. = Recovery (Expressed as Percent)  
 Control Limit Reference: Method 1613, Table 6, 10/94 Revision  
 R = Recovery outside of control limits  
 Nn = Value obtained from additional analysis  
 \* = See Discussion

## REPORT OF LABORATORY ANALYSIS

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**Method 1613B**

**Spike Recovery Relative Percent Difference (RPD) Results**

Client TRC-WI

Spike 1 ID LCS-73005  
 Spike 1 Filename F190830B\_03

Spike 2 ID LCSD-73008  
 Spike 2 Filename F190830B\_04

Compound	Spike 1 %REC	Spike 2 %REC	%RPD
2,3,7,8-TCDF	103	109	5.7
2,3,7,8-TCDD	110	109	0.9
1,2,3,7,8-PeCDF	107	104	2.8
2,3,4,7,8-PeCDF	112	109	2.7
1,2,3,7,8-PeCDD	100	96	4.1
1,2,3,4,7,8-HxCDF	119	119	0.0
1,2,3,6,7,8-HxCDF	108	107	0.9
2,3,4,6,7,8-HxCDF	106	104	1.9
1,2,3,7,8,9-HxCDF	104	103	1.0
1,2,3,4,7,8-HxCDD	115	113	1.8
1,2,3,6,7,8-HxCDD	117	116	0.9
1,2,3,7,8,9-HxCDD	120	119	0.8
1,2,3,4,6,7,8-HpCDF	109	110	0.9
1,2,3,4,7,8,9-HpCDF	103	101	2.0
1,2,3,4,6,7,8-HpCDD	104	102	1.9
OCDF	115	117	1.7
OCDD	113	119	5.2

%REC = Percent Recovered

RPD = The difference between the two values divided by the mean value

**REPORT OF LABORATORY ANALYSIS**

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### Method 1613B Spiked Sample Report

Client - TRC-WI

Client's Sample ID	N3-1-MS	Matrix	Solid
Lab Sample ID	10487441017-MS	Dilution	NA
Filename	Y190830A_16	Extracted	08/28/2019 15:05
Total Amount Extracted	11.0 g	Analyzed	08/30/2019 20:19
ICAL ID	Y190827	Injected By	ZMS
CCal Filename(s)	Y190830A_02		
Method Blank ID	BLANK-72988		

Native Isomers	Qs (ng)	Qm (ng)	% Rec.	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.20	0.21	104	2,3,7,8-TCDF-13C	2.00	83
Total TCDF				2,3,7,8-TCDD-13C	2.00	82
				1,2,3,7,8-PeCDF-13C	2.00	86
2,3,7,8-TCDD	0.20	0.22	108	2,3,4,7,8-PeCDF-13C	2.00	86
Total TCDD				1,2,3,7,8-PeCDD-13C	2.00	91
				1,2,3,4,7,8-HxCDF-13C	2.00	81
1,2,3,7,8-PeCDF	1.00	0.96	96	1,2,3,6,7,8-HxCDF-13C	2.00	82
2,3,4,7,8-PeCDF	1.00	1.01	101	2,3,4,6,7,8-HxCDF-13C	2.00	81
Total PeCDF				1,2,3,7,8,9-HxCDF-13C	2.00	85
				1,2,3,4,7,8-HxCDD-13C	2.00	80
1,2,3,7,8-PeCDD	1.00	0.93	93	1,2,3,6,7,8-HxCDD-13C	2.00	72
Total PeCDD				1,2,3,4,6,7,8-HpCDF-13C	2.00	73
				1,2,3,4,7,8,9-HpCDF-13C	2.00	71
1,2,3,4,7,8-HxCDF	1.00	1.08	108	1,2,3,4,6,7,8-HpCDD-13C	2.00	71
1,2,3,6,7,8-HxCDF	1.00	1.03	103	OCDD-13C	4.00	63
2,3,4,6,7,8-HxCDF	1.00	1.04	104			
1,2,3,7,8,9-HxCDF	1.00	0.97	97	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF				1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.00	1.09	109	2,3,7,8-TCDD-37Cl4	0.20	75 R
1,2,3,6,7,8-HxCDD	1.00	1.12	112			
1,2,3,7,8,9-HxCDD	1.00	1.04	104			
Total HxCDD						
1,2,3,4,6,7,8-HpCDF	1.00	1.43	143			
1,2,3,4,7,8,9-HpCDF	1.00	1.04	104			
Total HpCDF						
1,2,3,4,6,7,8-HpCDD	1.00	1.51	151			
Total HpCDD						
OCDF	2.00	2.43	122			
OCDD	2.00	4.73	237			

Qs = Quantity Spiked                      Qm = Quantity Measured                      Rec. = Recovery (Expressed as Percent)  
 %REC = Percent Recovered  
 RPD = The difference between the two values divided by the mean value

## REPORT OF LABORATORY ANALYSIS

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### Method 1613B Spiked Sample Report

Client - TRC-WI

Client's Sample ID	N3-1-MSD	Matrix	Solid
Lab Sample ID	10487441017-MSD	Dilution	NA
Filename	Y190830A_17	Extracted	08/28/2019 15:05
Total Amount Extracted	11.0 g	Analyzed	08/30/2019 21:05
ICAL ID	Y190827	Injected By	ZMS
CCal Filename(s)	Y190830A_02		
Method Blank ID	BLANK-72988		

Native Isomers	Qs (ng)	Qm (ng)	% Rec.	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.20	0.19	93	2,3,7,8-TCDF-13C	2.00	85
Total TCDF				2,3,7,8-TCDD-13C	2.00	81
				1,2,3,7,8-PeCDF-13C	2.00	91
2,3,7,8-TCDD	0.20	0.21	105	2,3,4,7,8-PeCDF-13C	2.00	87
Total TCDD				1,2,3,7,8-PeCDD-13C	2.00	93
				1,2,3,4,7,8-HxCDF-13C	2.00	81
1,2,3,7,8-PeCDF	1.00	0.96	96	1,2,3,6,7,8-HxCDF-13C	2.00	81
2,3,4,7,8-PeCDF	1.00	1.01	101	2,3,4,6,7,8-HxCDF-13C	2.00	81
Total PeCDF				1,2,3,7,8,9-HxCDF-13C	2.00	83
				1,2,3,4,7,8-HxCDD-13C	2.00	78
1,2,3,7,8-PeCDD	1.00	0.93	93	1,2,3,6,7,8-HxCDD-13C	2.00	74
Total PeCDD				1,2,3,4,6,7,8-HpCDF-13C	2.00	73
				1,2,3,4,7,8,9-HpCDF-13C	2.00	69
1,2,3,4,7,8-HxCDF	1.00	1.08	108	1,2,3,4,6,7,8-HpCDD-13C	2.00	71
1,2,3,6,7,8-HxCDF	1.00	1.04	104	OCDD-13C	4.00	59
2,3,4,6,7,8-HxCDF	1.00	1.02	102			
1,2,3,7,8,9-HxCDF	1.00	0.99	99	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF				1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.00	1.08	108	2,3,7,8-TCDD-37Cl4	0.20	75 R
1,2,3,6,7,8-HxCDD	1.00	1.15	115			
1,2,3,7,8,9-HxCDD	1.00	1.06	106			
Total HxCDD						
1,2,3,4,6,7,8-HpCDF	1.00	1.43	143			
1,2,3,4,7,8,9-HpCDF	1.00	1.02	102			
Total HpCDF						
1,2,3,4,6,7,8-HpCDD	1.00	1.54	154			
Total HpCDD						
OCDF	2.00	2.66	133			
OCDD	2.00	5.01	250			

Qs = Quantity Spiked                      Qm = Quantity Measured                      Rec. = Recovery (Expressed as Percent)  
 %REC = Percent Recovered  
 RPD = The difference between the two values divided by the mean value

## REPORT OF LABORATORY ANALYSIS

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### Method 1613 Spike Sample Results

Client - TRC-WI

Client Sample ID	N3-1			<u>Dry Weights</u>	
Lab Sample ID	10487441017	Sample Filename	Y190830A_13	Sample Amount	10.1 g
MS ID	10487441017-MS	MS Filename	Y190830A_16	MS Amount	10.1 g
MSD ID	10487441017-MSD	MSD Filename	Y190830A_17	MSD Amount	10.1 g

Analyte	Sample Conc. ng/Kg	MS/MSD Qs (ng)	MS Qm (ng)	MSD Qm (ng)	RPD	Background Subtracted		
						MS % Rec.	MSD % Rec.	RPD
2,3,7,8-TCDF	0.446	0.20	0.21	0.19	12.0	102	90	12.2
2,3,7,8-TCDD	0.000	0.20	0.22	0.21	2.8	108	105	2.8
1,2,3,7,8-PeCDF	1.183	1.00	0.96	0.96	0.5	95	95	0.5
2,3,4,7,8-PeCDF	2.182	1.00	1.01	1.01	0.7	99	99	0.7
1,2,3,7,8-PeCDD	0.827	1.00	0.93	0.93	0.3	93	92	0.3
1,2,3,4,7,8-HxCDF	5.293	1.00	1.08	1.08	0.6	103	102	0.7
1,2,3,6,7,8-HxCDF	4.252	1.00	1.03	1.04	1.7	98	100	1.8
2,3,4,6,7,8-HxCDF	6.105	1.00	1.04	1.02	1.8	97	96	1.9
1,2,3,7,8,9-HxCDF	1.925	1.00	0.97	0.99	1.8	95	97	1.9
1,2,3,4,7,8-HxCDD	0.000	1.00	1.09	1.08	0.5	107	107	0.5
1,2,3,6,7,8-HxCDD	4.433	1.00	1.12	1.15	2.5	108	110	2.6
1,2,3,7,8,9-HxCDD	3.041	1.00	1.04	1.06	1.8	101	103	1.9
1,2,3,4,6,7,8-HpCDF	43.724	1.00	1.43	1.43	0.2	99	99	0.2
1,2,3,4,7,8,9-HpCDF	3.838	1.00	1.04	1.02	1.9	100	99	1.9
1,2,3,4,6,7,8-HpCDD	57.861	1.00	1.51	1.54	2.4	92	96	3.9
OCDF	49.814	2.00	2.43	2.66	9.0	96	108	11.3
OCDD	316.107	2.00	4.73	5.01	5.7	76	90	16.9

**Definitions**

MS = Matrix Spike	CDD = Chlorinated dibenzo-p-dioxin
MSD = Matrix Spike Duplicate	CDF = Chlorinated dibenzo-p-furan
Qm = Quantity Measured	T = Tetra
Qs = Quantity Spiked	Pe = Penta
% Rec. = Percent Recovery	Hx = Hexa
RPD = Relative Percent Difference	Hp = Hepta
NA = Not Applicable	O = Octa
NC = Not Calculated	



# JOJO'S JUNGLE SPLASHPAD

WI, USA

OUR WATER PLAY SPACES ARE  
**MORE THAN ENTERTAINMENT.**

THEY BECOME A FOCAL POINT OF YOUR SITE, A PLACE  
WHERE VISITING BECOMES A **RITUAL.**

THEY FOSTER **GROWTH, IMAGINATION,**  
**INTERACTIONS.**

ENDLESS **THRILLS.**

**MEMORIES.**

**A UNIQUELY UNFORGETTABLE  
EXPERIENCE, FOR ALL.**

**LET'S PLAY!**

**IMMERSE**

**THRILL**

**REFRESH**

**COMPETE**

**EXPLORE**

**DISCOVER**

**IMAGINE**



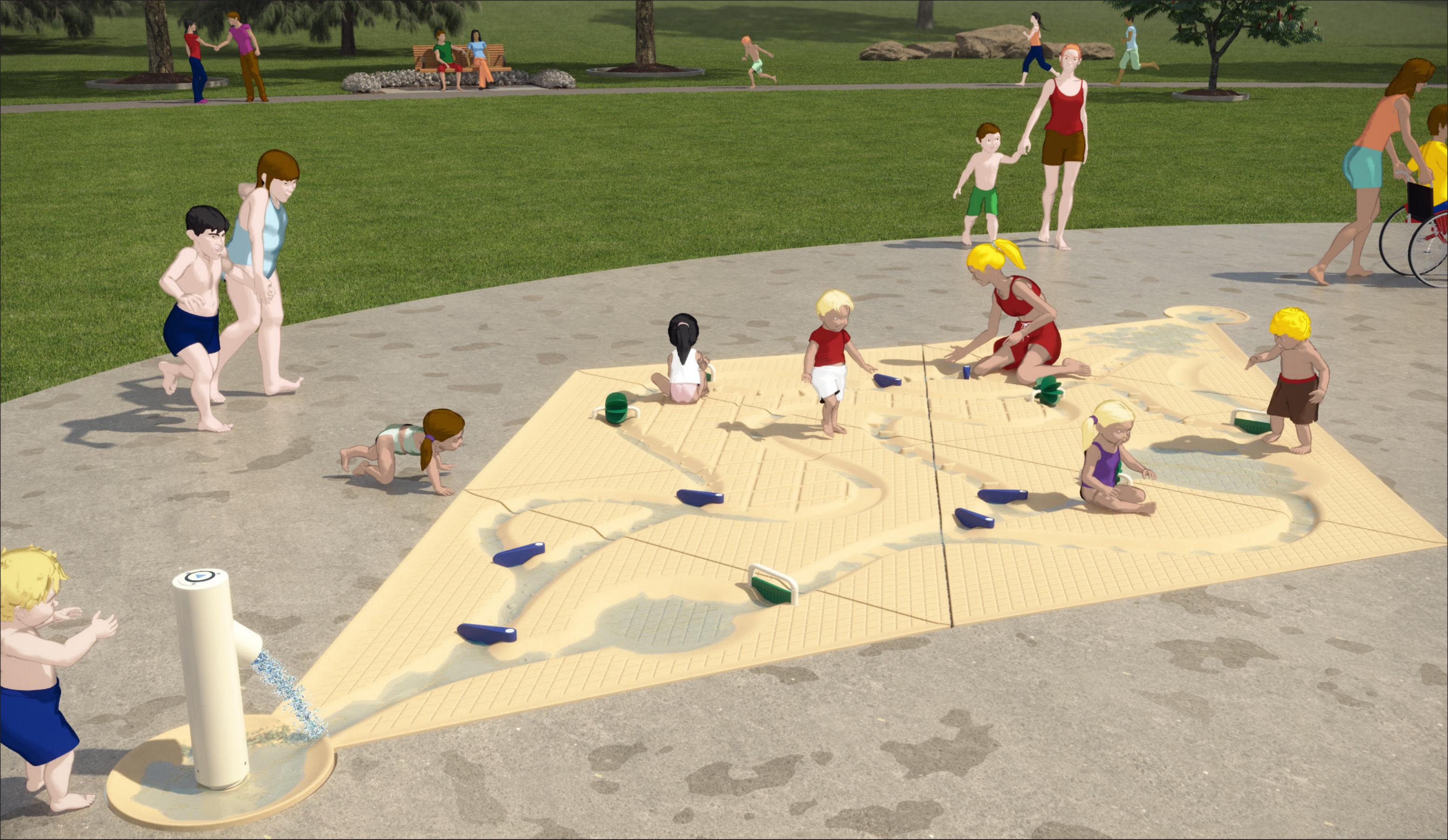


**SPLASHPAD®**  
VIEW 1

**JOJO'S JUNGLE SPLASHPAD, WI**  
Version E - 23997







**SPLASHPAD®**  
VIEW 3

**JOJO'S JUNGLE SPLASHPAD, WI**  
Version E - 23997

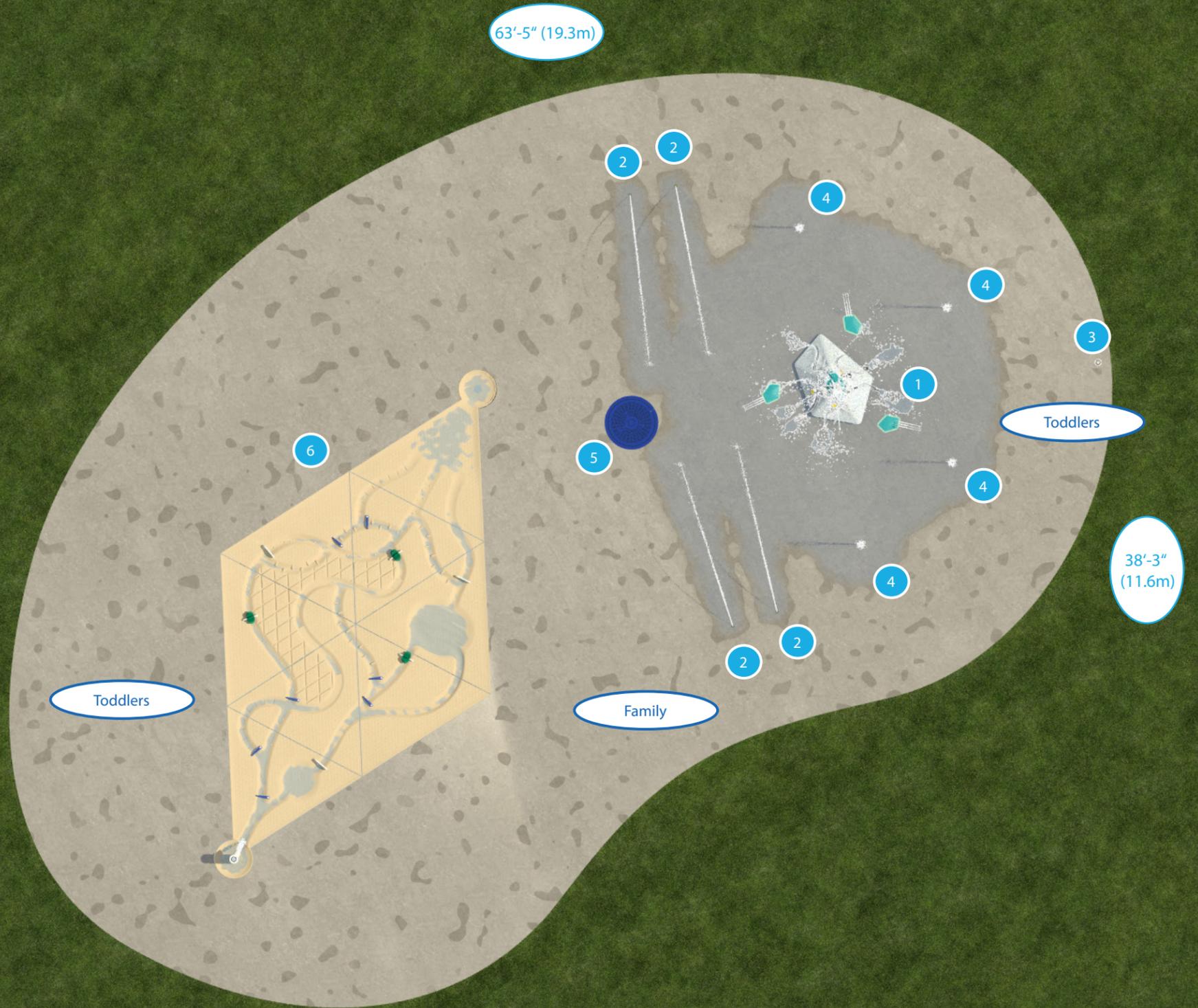




# SPLASHPAD® COMPONENTS

Total area: 1971ft<sup>2</sup> (183m<sup>2</sup>)  
 Spray area: 1212ft<sup>2</sup> (113m<sup>2</sup>)

REF	PRODUCT	QTY	GPM	LPM
1	Alto N°3 VOR 7132	1	15.5	58.7
2	Directional Jet N°1 VOR 0305	4	8	30.3
3	Foot Activator VOR 0606	1	0	0
4	Jet Stream N°1 VOR 7512	4	10	37.9
5	Playsafe Drain N°1 VOR-1001.4000	1	0	0
6	Water Journey - Labyrinth VOR 7120	1	7.5	28.4
TOTAL WATER FLOW		QTY	GPM	LPM
		12	41.0	155.3



Colored concrete and Environment are for Illustration purpose only and not supplied by Vortex. Not for construction



**A CLEAR  
SOURCE  
OF  
FUN**



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## ALTO N°3

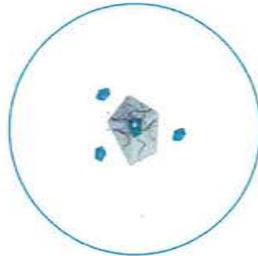
VOR 7132

### PRODUCTS HIGHLIGHTS

- Features a bigger surface area and wider indentations for even more tactile play experiences.
- Incorporates Water Journey™ Hop—textured stones that, when skipped and stepped on, impact the pressure of Alto's geysering summit.



Scale



Spray Zone  
216.00 X 216.00 in  
548.64 X 548.64 cm





**COLORS**

4 color options

**SOLUTIONS TYPES**

Water Journey™

**PHYSICAL DIMENSIONS (LWH)**

78.00 X 73.00 X 23.00 in

198.12 X 185.42 X 58.42 cm

**PRESSURE**

1.50–2.00 PSI

0.10–0.14 bar

**FLOW**

13.00–18.00 GPM

49.21–68.14 LPM

**BAYS**

Toddler

**EFFECTS**

Cascading water, Gentle jet stream

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**CAREERS**

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**COMMUNITY & SPONSORSHIP**

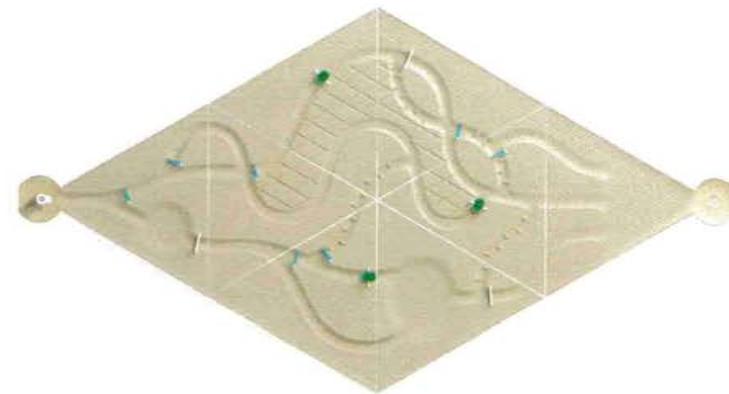


## LABYRINTH

VOR 7120

### PRODUCTS HIGHLIGHTS

- The water ripples and cascades endlessly as it moves through the different formations.
- All the while, water gates, watermills and strainers let the little ones manipulate the current as they float objects downstream.
- This product can also be configured with the rest of the Water Journey™ collection for more play opportunities.





**COLORS**

As shown

**SOLUTIONS TYPES**

Water Journey™

**PHYSICAL DIMENSIONS (L/W/H)**

314.50 X 194.00 X 8.75 in

798.83 X 492.76 X 22.23 cm

**FLOW**

7.00–8.00 GPM

26.50–30.28 LPM

**BAYS**

Family

**TECHNOLOGIES**



**PLAYSTART™ ACTIVATOR**

- On-demand activation saves water
- Constructed of durable stainless steel - vandal resistant
- No moving parts
- Low voltage - safe fun
- Easy operation - for kids of all ages & abilities
- Light signal to alert when the activator is activated

**OUR COMPANY**

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Who we are

**CAREERS**

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Available positions



Share

## DIRECTIONAL JET N°1

VOR 0305

### PRODUCTS HIGHLIGHTS

- Provides high interactivity with low water consumption
- Encourages different types of game playing



Scale



Spray Zone  
36.00 X 137.00 in  
91.44 X 347.98 cm



### DETAILS

---

#### COLORS

As shown

---

#### INLETS

1

---

#### SOLUTIONS TYPES

Splashpad®

---

#### PHYSICAL DIMENSIONS (L/WH)

3.00 X 3.00 X 0.00 in  
7.62 X 7.62 X 0.00 cm



# JET STREAM N°1

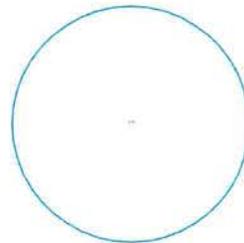
VOR 7512

## PRODUCTS HIGHLIGHTS

- Enjoy running your feet and hands in this feature
- Provide high interactivity with low water consumption



Scale



Spray Zone  
60.00 X 60.00 in  
152.40 X 152.40 cm



## DETAILS

### COLORS

As shown

### INLETS

1

### SOLUTIONS TYPES

Splashpad®, Spraypoint®

### PHYSICAL DIMENSIONS (L/W/H)

6.00 X 6.00 X 0.00 in

15.24 X 15.24 X 0.00 cm

---

AGREEMENT BETWEEN THE CITY OF WAUSAU AND JO JO'S JUNGLE

THIS AGREEMENT made this \_\_\_\_\_ day of \_\_\_\_\_, 2019, by and between the City of Wausau, a municipal corporation of the State of Wisconsin, hereinafter referred to as "CITY," and the JoJo's Jungle, hereinafter referred to as "JO JO'S";

WITNESSETH:

WHEREAS, there is presently located within the corporate limits of the City of Wausau a city park presently known as Brockmeyer Park; and

WHEREAS, JO JO'S wishes to donate to CITY a water feature which includes a Splashpad and Labyrinth to the CITY within Brockmeyer Park adjacent to the inclusive playground, and as a condition of this gift to CITY, JO JO'S wishes CITY to agree to provide all operational and maintenance needs in the future.

NOW, THEREFORE, the parties hereto agree as follows:

1. That CITY accepts the gift of the water feature from JO JO'S, and both parties agree that the water feature shall be the sole property of CITY during the term of this agreement.
2. That CITY agrees to keep and maintain the water feature in Brockmeyer Park however JO JO'S understands that the water feature is a high maintenance feature and requires specific maintenance that the CITY may not be able to complete.
3. CITY reserves the right to remove the water feature at any time, if the water feature becomes damaged beyond repair, continually functions improperly or becomes a safety hazard within the park.

IN WITNESS WHEREOF, this agreement has been duly executed the day and year first written above.

**JOJO'S JUNGLE**

**CITY OF WAUSAU**

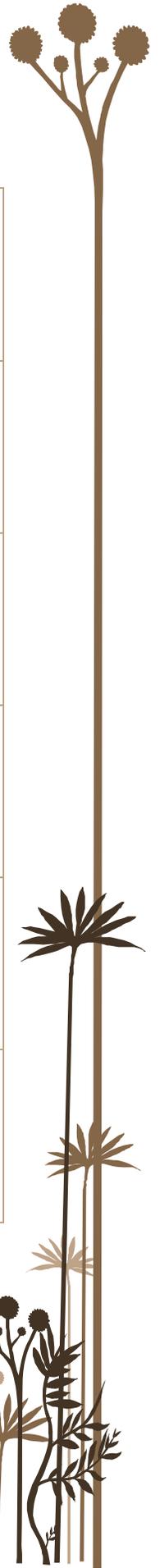
\_\_\_\_\_  
Patrick Hoerter

\_\_\_\_\_  
Robert Meilke, Mayor

\_\_\_\_\_  
Toni Rayala, City Clerk

# June Kaiser

# 2019



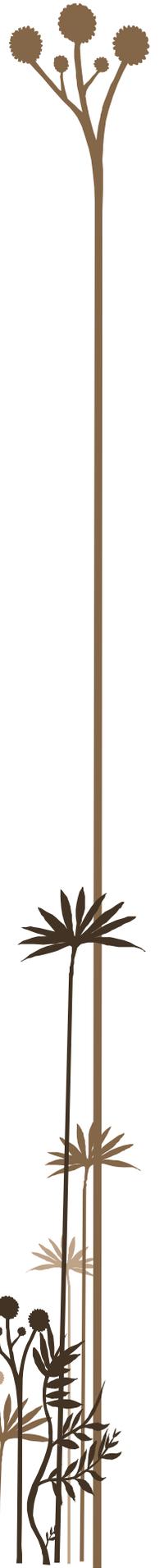
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26	27	28	29	30	31	1
2	3	4	5	6	7	<b>8 FREE</b> Adults 263 Youth 186 Passes 0
9 Adults 68 Youth 124 Passes 39	<b>10</b> <b>CLOSED</b> School Snow Make up day	11 Adults 14 Youth 84 Passes 19	12 <b>CLOSED for</b> <b>WEATHER</b>	13 Adults 22 Youth 66 Passes 22 Free after 6 A 15, Y 28	14 <b>CLOSED for</b> <b>WEATHER</b>	15 Adults 15 Youth 44 Passes 19
16 <b>CLOSED for</b> <b>WEATHER</b>	17 Adults 45 Youth 110 Passes 36	18 Adults 29 Youth 69 Passes 18	19 Adults 19 Youth 70 Passes 23	20 Adults 23 Youth 61 Passes 21 Free after 6 A 31, Y 45	21 Adults 34 Youth 85 Passes 17	22 <b>FREE</b> Adults 167 Youth 201
<b>23 FREE</b> Adults 15 Youth 39 Passes 0	24 Adults 4 Youth 3 Early close Poor weather	25 Adults 79 Youth 147 Passes 34	26 Adults 116 Youth 240 Passes 39	27 Adults 23 Youth 64 Passes 0 Free After 6 Storms	28 Adults 92 Youth 210 Passes 64	29 Adults 176 Youth 246 Passes 15
30 Adults 1 Youth 3 Passes 1	1	2	3	4	5	6

Notes:



# July Kaiser

# 2019



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30 Adults 11 Youth 17 Passes 13	1 Adults 30 Youth 71 Passes 17	2 Adults 108 Youth 174 Passes 25	3 Adults 45 Youth 48 Passes 11 <b>Free after 6 A 1, Y 5</b>	4 Adults 68 Youth 104 Passes 24	5 Adults 65 Youth 67 Passes 22	
7 Adults 78 Youth 105 Passes 35	8 Adults 62 Youth 109 Passes 31	9 Adults 66 Youth 18 Passes 17	10 Adults 34 Youth 76 Passes 13	11 Adults 42 Youth 70 Passes 3 <b>Free after 6 A 34, Y 47</b>	12 Adults 54 Youth 102 Passes 27	13 Adults 86 Youth 117 Passes 17
<b>14 Free</b> <b>Adults 258</b> <b>Youth 326</b> <b>Passes 0</b>	15 Adults 24 Youth 47 Passes 14	16 Adults 41 Youth 82 Passes 18	17 Adults 43 Youth 71 Passes 14	18 Adults 22 Youth 34 Passes 12 <b>Free after 6 A 4, Y 8</b>	19 Adults 109 Youth 196 Passes 27	20 <b>Closed due to weather</b>
21 Adults 41 Youth 63 Passes 20	22 Adults 25 Youth 53 Passes 6	23 Adults 39 Youth 68 Passes 51	24 Adults 53 Youth 91 Passes 38	25 Adults 62 Youth 80 Passes 14 <b>Free after 6 A 27, Y 31</b>	26 Adults 10 Youth 26 Passes 8	27 Adults 64 Youth 66 Passes 8
28 Adults 42 Youth 56 Passes 10	29 Adults 15 Youth 24 Passes 8	30 Adults 19 Youth 23 Passes 4	31 Adults 19 Youth 25 Passes 12	1	2	3
4	5	6	7	8	9	10

Notes:

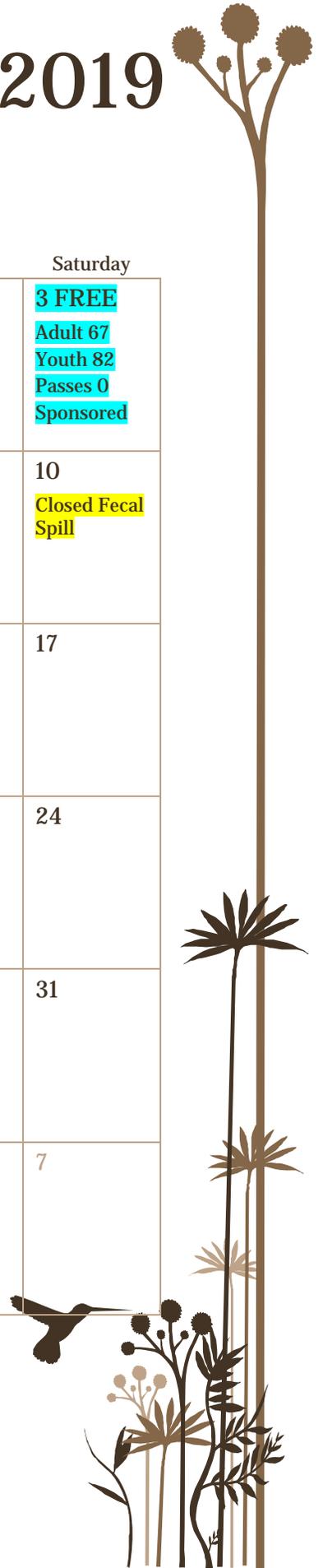


# August Kaiser

# 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	30	31	1 Adult 24 Youth 33 Passes 8 Free after 6 A 70, Y 43	2 Adult 46 Youth 70 Passes 17	3 FREE Adult 67 Youth 82 Passes 0 Sponsored
4 FREE Adult 153 Youth 238 Passes 0	5 Closed Storms	6 Adult 32 Youth 54 Passes 92	7 Adult 15 Youth 27 Passes 15	8 Adult 20 Youth 36 Passes 0 Free after 6 A 11, Y 16	9 Adult 11 Youth 17 Passes 22	10 Closed Fecal Spill
11 Adult 15 Youth 14 Passes 9	12 Closed for Season	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

Notes:



# June Memorial

# 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26	27	28	29	30	31	1
2	3	4	5	6	7	8 FREE Adults 146 Youth 249 15
9 FREE Adults 86 Youth 165	10 Closed School Snow Make-Up Day	11 Adults 8 Youth 50 Passes 40	12 Pool Closed Weather	13 Adults 13 Youth 42 Passes 29 Free after 6 A 4, Y 6	14 Pool Closed Weather	15 Adults 9 Youth 28 Passes 10
16 Pool Closed Weather	17 Adults 33 Youth 75 Passes 79	18 Adults 23 Youth 56 Passes 62	19 Adults 16 Youth 46 Passes 35	20 Adults 29 Youth 73 Passes 23 Free after 6 A 0, Y 1	21 Adults 17 Youth 65 Passes 32	22 FREE Adults 126 Youth 137 Passes 15 Sponsored
23 Adults 1 Youth 0 Passes 3 Poor weather	24 Closed for Weather	25 Adults 73 Youth 120 Passes 69	26 Adults 70 Youth 132 Passes 66	27 Adults 17 Youth 57 Passes 29 Free after 6 Storms	28 Adults 47 Youth 95 Passes 51	29 Adults 131 Youth 169 Passes 38
30 FREE Adults 15 Youth 26 Passes 19						

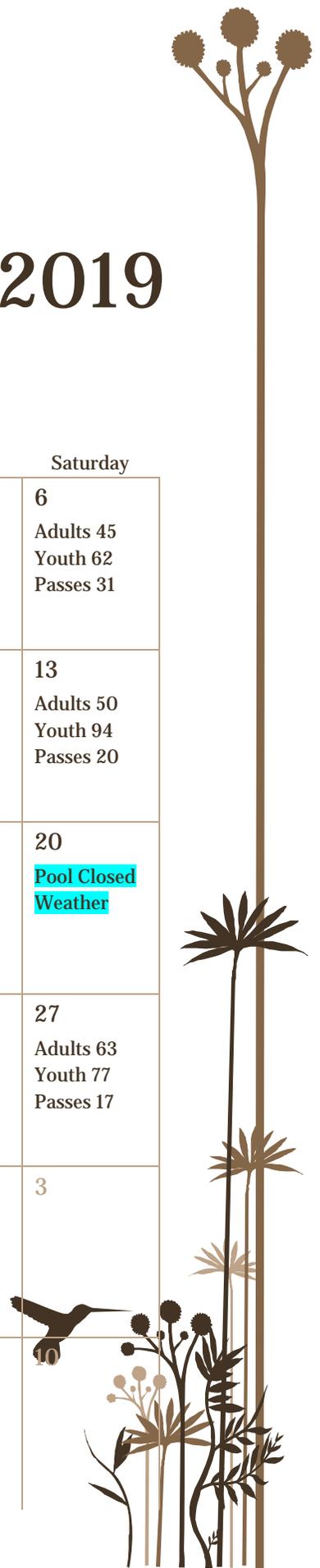
Notes:



# July Memorial

# 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	1 Adults 15 Youth 26 Passes 19	2 Adults 29 Youth 50 Passes 24	3 Adults 72 Youth 129 Passes 56	4 Adults 19 Youth 30 Passes 40 Free after 6 A 3, Y 5	5 Adults 46 Youth 81 Passes 21	6 Adults 45 Youth 62 Passes 31
7 Adults 48 Youth 53 Passes 40	8 Adults 31 Youth 67 Passes 32	9 Adults 31 Youth 60 Passes 23	10 Adults 44 Youth 73 Passes 42	11 Adults 29 Youth 64 Passes 28 Free after 6 A 3, Y 5	12 Adults 33 Youth 44 Passes 35	13 Adults 50 Youth 94 Passes 20
14 Adults 67 Youth 100 Passes 29	15 Adults 24 Youth 52 Passes 11	16 Adults 47 Youth 71 Passes 43	17 Adults 29 Youth 80 Passes 54	18 Adults 16 Youth 30 Passes 18 Free after 6 A 8, Y 12	19 Adults 38 Youth 86 Passes 56	20 Pool Closed Weather
21 FREE Adults 177 Youth 178 Passes 0	22 Adults 12 Youth 20 Passes 27	23 Adults 29 Youth 56 Passes 70	24 Adults 30 Youth 60 Passes 44	25 Adults 51 Youth 108 Passes 22 Free after 6 A 16, Y 34	26 Adults 10 Youth 22 Passes 3	27 Adults 63 Youth 77 Passes 17
28 Adults 19 Youth 35 Passes 25	29 Adults 18 Youth 44 Passes 39	30 Adults 15 Youth 29 Passes 17	31 Adults 21 Youth 43 Passes 49	1	2	3
4	5	6	7	8	9	10

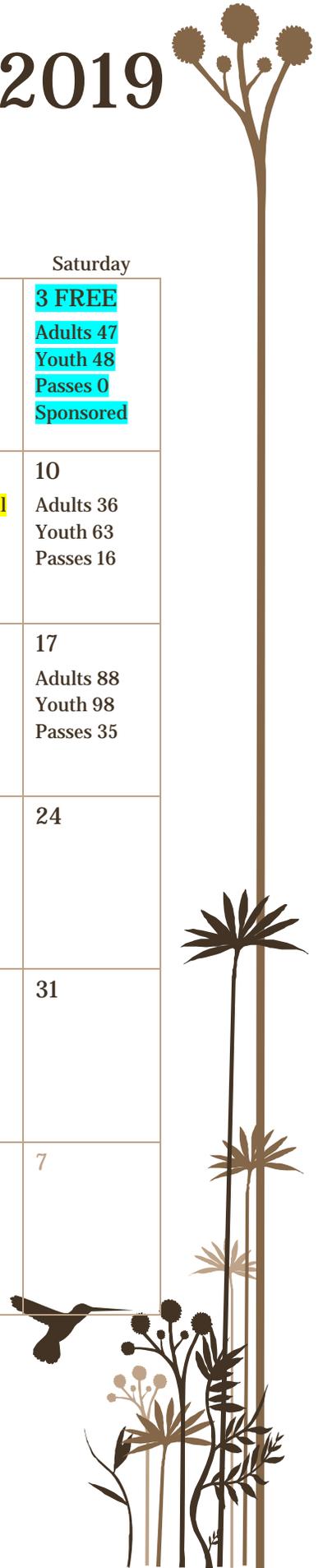


# August Memorial

# 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	30	31	1 Adults 14 Youth 35 Passes 65 Free after 6 A 11, Y 17	2 Adults 29 Youth 50 Passes 34	3 FREE Adults 47 Youth 48 Passes 0 Sponsored
4 Adults 68 Youth 126 Passes 37	5 Closed for weather	6 Adults 36 Youth 63 Passes 177	7 Adults 11 Youth 21 Passes 26	8 Adults 9 Youth 52 Passes 13 Free after 6 Y 1	9 Closed Fecal spill	10 Adults 36 Youth 63 Passes 16
11 Adults 9 Youth 13 Passes 13	12 Adults 19 Youth 46 Passes 42	13 Adults 16 Youth 36 Passes 5	14 Adults 13 Youth 26 Passes 15	15 Adults 46 Youth 78 Passes 27 Free after 6 Zero	16 Adults 0 Youth 2 Passes 0	17 Adults 88 Youth 98 Passes 35
18 Closed for Weather	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

Notes:



# June Schulenburg

# 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26	27	28	29	30	31	1
2	3	4	5	6	7	<b>8 Free</b> Adults 200 Youth 331 Passes 0
9 Adults 44 Youth 95 Passes 20	10 Closed due to weather	11 Adults 8 Youth 41 Passes 8	12 Closed due to weather	13 Adults 1 Youth 23 Passes 13 Free after 6 A 13, Y 22	14 Closed due to weather	15 Adults 11 Youth 34 Passes 1
16 Closed due to weather	17 Adults 55 Youth 144 Passes 46	18 Adults 23 Youth 90 Passes 33	19 Register tape error	20 Adults 30 Youth 88 Passes 6 Free after 6 A 24, Y 54	21 Adults 41 Youth 101 Passes 38	22 FREE Adults 145 Youth 249 Passes 0 Sponsored
23 Adults 2 Youth 3 Passes 4	24 Closed due to weather	25 Adults 87 Youth 196 Passes 61	26 Adults 88 Youth 228 Passes 67	27 Adults 18 Youth 38 Passes 21 Storms	28 Adults 88 Youth 103 Passes 41	29 Adults 186 Youth 268 Passes 59
30 Adults 7 Youth 12 Passes 9	1	2	3	4	5	6

Notes:

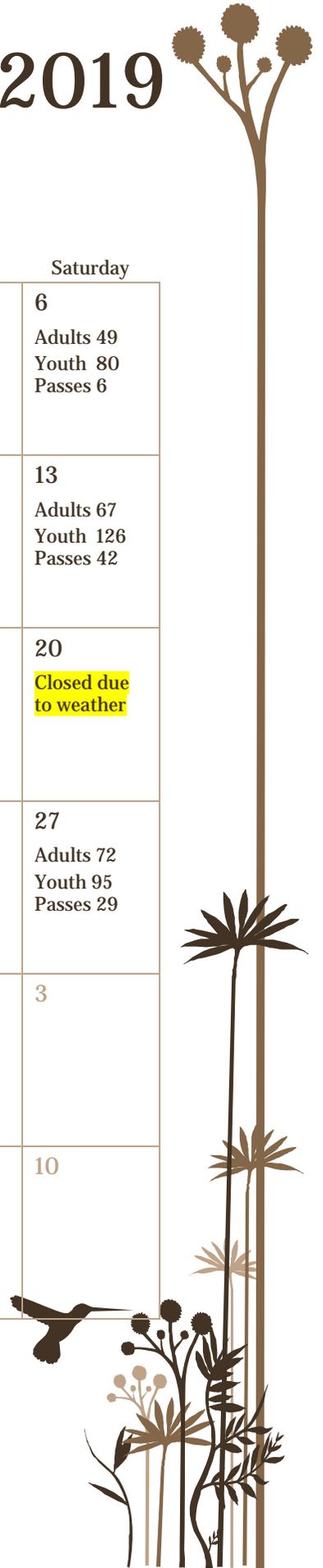


# July Schulenburg

# 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	1 Adults 19 Youth 51 Passes 19	2 Adults 20 Youth 55 Passes 57	3 Adults 69 Youth 129 Passes 92	4 Adults 53 Youth 72 Passes 18 <b>Free after 6</b> <b>A 1, Y 6</b>	5 Adults 106 Youth 114 Passes 36	6 Adults 49 Youth 80 Passes 6
<b>7 FREE</b> <b>Adults 120</b> <b>Youth 190</b> <b>Passes 0</b>	8 Adults 50 Youth 102 Passes 27	9 Adults 58 Youth 116 Passes 55	10 Adults 50 Youth 149 Passes 41	11 Adults 36 Youth 97 Passes 18 <b>Free after 6</b> <b>A 26, Y 51</b>	12 Adults 60 Youth 118 Passes 40	13 Adults 67 Youth 126 Passes 42
14 Adults 104 Youth 119 Passes 54	15 Adults 29 Youth 36 Passes 15	16 Adults 92 Youth 163 Passes 45	17 Adults 51 Youth 102 Passes 37	18 Adults 23 Youth 73 Passes 19 <b>Free after 6</b> <b>A 12, Y 22</b>	19 Adults 110 Youth 209 Passes 66	20 <b>Closed due to weather</b>
21 Adults 49 Youth 88 Passes 28	22 Adults 29 Youth 63 Passes 19	23 Adults 32 Youth 61 Passes 24	24 Adults 55 Youth 132 Passes 39	25 Adults 37 Youth 87 Passes 42 <b>Free after 6</b> <b>A 13, Y 22</b>	26 Adults 6 Youth 17 Passes 6	27 Adults 72 Youth 95 Passes 29
<b>28 FREE</b> <b>Adults 80</b> <b>Youth 112</b> <b>Passes 0</b>	29 Adults 21 Youth 62 Passes 21	30 Adults 11 Youth 43 Passes 14	31 Adults 29 Youth 76 Passes 16	1	2	3
4	5	6	7	8	9	10

Notes:



# August Schulenburg

# 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	30	31	1 Adults 33 Youth 62 Passes 20 Free after 6 A 34, Y 48	2 Adults 42 Youth 71 Passes 21	3 FREE Adults 82 Youth 115 Passes 0 Sponsored
4 Adults 53 Youth 92 Passes 23	5 Closed due to weather	6 Adults 36 Youth 96 Passes 30	7 Adults 62 Youth 20 Passes 28	8 Adults 13 Youth 42 Passes 25 Free after 6 A 37, Y 48	9 Adults 24 Youth 45 Passes 47	10 Adults 28 Youth 35 Passes 16
11 Adults 16 Youth 17 Passes 0	12 Closed for the season	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

Notes:

