

APPENDIX D

SOURCE TESTING: SUMMARY OF REQUIREMENTS FOR MEASUREMENTS AND ALTERNATIVES

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***** NOTES FOR FOLLOWING TABLE *****

- (1) Each reference to a measurement requirement includes the following requirements for the substances to be tested and type of test to be performed:
 - (a) The test shall measure the quantities of all listed substances whose presence in detectable quantities can be determined using the ARB-adopted test method or other method specified in Section IX.A. for the substance indicated. Therefore the test indicated for "dioxins" shall include measurement of all the polychlorinated dibenzodioxins and dibenzofurans to which the ARB-adopted method for dioxins and furans applies. Specifically, the test results shall include the determination of total tetra-, penta-, hexa-, hepta-, and octa- PCDD/PCDF homologue groups and all the 2,3,7,8-substituted PCDD/PCDF isomers listed in the method; and
 - (b) ARB-adopted test methods which are necessary to characterize associated source conditions, including stack flow rate and moisture content, shall also be performed to ensure a proper source test for the material indicated. These associated tests shall be identified in the proposed source test protocol in the inventory plan.
- (2) Reference to the "full set of metals" or "all metals" herein refers to the following listed substances which are required to be measured and reported: arsenic (As), beryllium (Be), cadmium (Cd), chromium (Cr) which includes total chromium and hexavalent chromium (Cr VI), copper (Cu), lead (Pb), manganese (Mn), mercury (Hg), nickel (Ni), selenium (Se), and zinc (Zn).
- (3) Fuel analysis shall include analysis for the full set of metals referred to in Note (2), chlorine content, and sulfur content.
- (4) The notation "two-step test" means the protocol and testing in EICG Section IX.H. for specified classes of facilities.
- (5) The symbol "-" in the table column for "Alternative (if any)" means that no alternative to the specified requirement is available.
- (6) The symbol "." in the table indicates "same as above." The symbol "- -" in the table means "same across cells." These two symbols are used to clarify column content and row header content information that simply repeats from table cells above or across, respectively.

- (7) Waste water treatment facilities may propose an alternative testing approach based on a combination of water sampling and air sampling to calculate the airborne emissions of the PFAS-related substances. The results of water testing at the influent and other appropriate locations proposed within the facility may be used in conjunction with appropriate engineering calculations, as specified in EICG Section IX.G.(1)(c)(iii), to calculate the airborne emissions expected of not only the water-tested PFAS (those not indented in the table below) but also the specified related airborne forms (indented in the table below). Air sampling (such as flux chamber sampling) may be required to calculate air emissions of some substances. All air emission estimates derived from water sampling and air testing results shall be included in the final emission inventory report. The proposed two-step protocol and any alternatives are subject to the approval of the air district and CARB. The list of required PFAS-related substances is presented in the table below.

Target PFAS-related Substances for Alternative Wastewater Emission Testing

Chemical Name (and Acronym, if Available)	CAS
Perfluorobutanoic acid {Perfluorobutyric acid} {PFBA}	375224
Perfluoropentanoic acid {PFPeA}	2706903
Perfluorohexanoic acid {PFHxA}	307244
Perfluoroheptanoic acid {PFHpA}	375859
Perfluorooctanoic acid {PFOA}	335671
Perfluorooctanoic acid {PFOA} and its salts, esters, and sulfonates	2795393
Perfluorooctanoic acid fluoride	335660
Ammonium perfluorooctanoate	3825261
Perfluorononanoic acid {PFNA}	375951
Perfluorodecanoic acid {PFDA}	335762
Perfluoroundecanoic acid {PFUnA}	2058948
Perfluorododecanoic acid {PFDoA}	307551
Perfluorododecane sulfonate	79780395
Perfluoro-1-dodecanesulfonate, sodium salt {PFDoS}	1260224541
Perfluorotridecanoic acid {PFTrDA}	72629948
Perfluorotetradecanoic acid {PFTeDA}	376067
Perfluorohexadecanoic acid {PFHxDA}	67905195
Perfluorooctadecanoic acid {PFODA}	16517116
Perfluorobutane sulfonic acid {PFBS}	375735
Perfluorobutane sulfonate (and salts)	1152
Perfluoropentane sulfonic acid	2706914
Perfluoropentane sulfonate {PFPeS}	175905369
Perfluorohexane sulfonic acid/sulfonate {PFHxS}	355464
Perfluoroheptane sulfonic acid	375928
Perfluorooctane sulfonic acid	1763231
Perfluorooctane sulfonate {PFOS}	45298906
Perfluorooctane sulfonyl fluoride	307357
Perfluorononane sulfonate {PFNS}	474511074

Chemical Name (and Acronym, if Available)	CAS
Perfluorodecane sulfonic acid	335773
Perfluorododecane sulfonate	79780395
Perfluoro-1-dodecanesulfonate, sodium salt {PFDoS}	1260224541
Perfluorooctane sulfonamide {PFOSA}	754916
Decafluoro-4-(pentafluoroethyl)cyclohexanesulfonate {PFecHS}	67584423
N-Ethylperfluorooctanesulfonamidoethyl alcohol {N-EtFOSE}	1691992
N-Methylperfluorooctanesulfonamidoethanol {N-MeFOSE}	24448097
N-Ethyl perfluorooctane sulfonamid {EtFOSA} {MeFOSAm} {Sulfluramid}	4151502
Perfluoro-N-methyloctanesulfonamide {N-MeFOSA}	31506328
N-(Heptadecafluorooctylsulfonyl)-N-methylglycine {NMeFOSAA}	2355319
2-(N-Ethyl-perfluorooctanesulfonamido)acetic acid {NEtFOSAA}	2991506
4:2 Fluorotelomer sulfonic acid {FTS 4:2} {also: 1H,1H,2H,2H-Perfluorohexane sulfonic acid}	757124724
6:2 Fluorotelomer sulfonic acid {also: 1H,1H,2H,2H-Perfluorooctane sulfonic acid}	27619972
6:2 Fluorotelomer sulfonate {FTS 6:2}	425670753
6:2 Fluorotelomer alcohol {FtOH 6:2}	647427
6:2 Fluorotelomer acrylate	17527296
2-Perfluorohexyl ethyl methacrylate {6:2 FTMAC}	1996889
6:2 Fluorotelomer acetate	37858030
6:2 Fluorotelomer carboxylic acid {also: 2-perfluorohexyl ethanoic acid}	53826123
6:2 Fluorotelomer unsaturated carboxylic acid {also: 2H-perfluoro-2-octenoic acid}	70887886
8:2 Fluorotelomer sulfonic acid {FTS 8:2} {also: 1H,1H,2H,2H-Perfluorodecane sulfonic acid}	39108344
8:2 Fluorotelomer sulfonate	481071787
8:2 Fluorotelomer alcohol {FtOH 8:2}	678397
8:2 Fluorotelomer unsaturated carboxylic acid {also: 2H-perfluoro-2-decenoic acid}	70887842
8:2 Fluorotelomer carboxylic acid {also: 2-perfluorooctyl ethanoic acid}	27854315
10:2 Fluorotelomer sulfonic acid {also: 1H,1H,2H,2H-Perfluorododecane sulfonate}	120226600
10:2 Fluorotelomer alcohol {FtOH 10:2}	865861
10:2 Fluorotelomer carboxylic acid {also: 2-perfluorodecyl ethanoic acid}	53826134
3:3 Fluorotelomer carboxylic acid {also: 2H,2H,3H,3H-Perfluorohexanoic acid}{3:3 FTCA}	356025
5:3 Fluorotelomer carboxylic acid {also: 2H,2H,3H,3H-Perfluorooctanoic acid} {5:3 acid}	914637493
7:3 Fluorotelomer carboxylic acid {also: 2H,2H,3H,3H-Perfluorodecanoic acid}	812704
Hexafluoropropylene oxide dimer acid {HFPO} and its ammonium salt {GenX/GenX Chemicals}	13252136
Hexafluoropropylene oxide dimer acid {HFPO} and its ammonium salt {GenX/GenX Chemicals} (alt. CAS;see 13252136)	62037803
Perfluoro(2-methyl-3-oxahexanoic) acid {GenX/GenX Chemicals} (alt. CAS; see 13252136)	62037803
Ammonium 4,8-dioxa-3H-perfluorononanoate {ADONA Ammonium salt}	958445448
4,8-Dioxa-3H-perfluorononanoic acid {ADONA}	919005144
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid {9-Cl-PF3ONS}	756426581
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid {11-Cl-PF3OUdS}	763051929
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonate (potassium or other salts)	83329899
Nonafluoro-3,6-dioxaheptanoic acid {NFDHA}	151772586
Perfluoro(2-ethoxyethane) sulfonic acid {PFEEESA}	113507827

Chemical Name (and Acronym, if Available)	CAS
Perfluoro-3-methoxypropanoic acid {PFMPA}	377731
Perfluoro-4-methoxybutanoic acid {PFMBA}	863090895
Perfluoroisobutylene {PFIB}	382218
2-(Perfluorooctyl)ethyl methacrylate	1996889
1-Iodo-2-(perfluorooctyl)ethane	2043530
Other Synonyms Used for the Above Listed Chemicals	
Cyclohexanesulfonic acid, decafluoro(pentafluoroethyl)-, potassium salt (see Decafluoro-4-(pentafluoroethyl)cyclohexanesulfonate)	67584423
2H-perfluoro-2-decenoic acid {8:2 FTUCA} {8:2 FOUEA} (see 8:2 Fluorotelomer unsaturated carboxylic acid)	70887842
2-perfluorodecyl ethanoic acid {10:2 FDEA} (see 10:2 Fluorotelomer carboxylic acid)	53826134
2-perfluorohexyl ethanoic acid {6:2FTCA} {6:2 FHEA} (see 6:2 Fluorotelomer carboxylic acid)	53826123
2H-perfluoro-2-octenoic acid {6:2 FHUEA} (see 6:2 Fluorotelomer unsaturated carboxylic acid}	70887886
2-perfluorooctyl ethanoic acid {8:2 FTA} {8:2 FOEA} (see 8:2 Fluorotelomer carboxylic acid)	27854315
Sodium perfluoro-1-dodecanesulfonate {PFDoS} (see Perfluoro-1-dodecanesulfonate, sodium salt)	1260224541
2H,2H,3H,3H-Perfluorohexanoic acid {3:3 FTCA} (see 3:3 Fluorotelomer carboxylic acid)	356025
2H,2H,3H,3H-Perfluorooctanoic acid {5:3 acid} (see 5:3 Fluorotelomer carboxylic acid)	914637493
2H,2H,3H,3H-Perfluorodecanoic acid (see 7:3 Fluorotelomer carboxylic acid)	812704
N-Ethyl-N-((heptadecafluorooctyl)sulfonyl)glycine (see 2-(N-Ethyl-perfluorooctanesulfonamido)acetic acid)	2991506
N-Methylperfluorooctanesulfonic acid (see Perfluoro-N-methyloctanesulfonamide)	31506328
N-Methyl perfluorooctanesulfonamideoacetic acid (see N-(Heptadecafluorooctylsulfonyl)-N-methylglycine)	2355319
1H,1H,2H,2H-Perfluorohexane sulfonic acid (see 4:2 Fluorotelomer sulfonic acid)	757124724
1H,1H,2H,2H-Perfluorooctane sulfonic acid (see 6:2 Fluorotelomer sulfonic acid)	27619972
1H,1H,2H,2H-Perfluorodecane sulfonic acid (see 8:2 Fluorotelomer sulfonic acid)	39108344
1H,1H,2H,2H-Perfluorododecane sulfonate (see 10:2 Fluorotelomer sulfonic acid)	120226600

APPENDIX D

Source Testing:

Summary of Requirements for Measurements and Alternatives

(See notes preceding the table for further explanation of terms and symbols used in the table.)

(Symbol “..” indicates “same as above.” Symbol “- -” means “same across cells”.)

Emitting Process, Device or Facility Activity	Substance and Type of Test	Alternative (if any)
--COMBUSTION--	- -	- -
1. Incinerators	- -	- -
(a) Incinerators burning hazardous, municipal, or biomedical waste, or burning tires, or heating 55 gallon (or other sizes) drums for the purpose of drum reconditioning, reclamation, or recycling. Does not include refuse incinerators at schools, prisons, restaurants, or hotels.	a. Full set metals/stack test	Small business: Fuel analysis
..	b. Hydrogen chloride/stack test	Small business: Fuel analysis
..	c. PAH/stack test	-
..	d. Dioxins/stack test	-
..	e. Formaldehyde/stack test	Small business: Not required
..	f. Benzene/stack test	Small business: Not required
..	g. Vinyl chloride/stack test	Small business: Not required
..	h. PCBs/stack test: required any time that dioxins are tested. PCBs shall be speciated to include: PCB 77, PCB 81, PCB 105, PCB 114, PCB 118, PCB 123, PCB 126, PCB 156, PCB 157, PCB 167, PCB 169, and PCB 189.	-
(b) Incinerators at schools, prisons, restaurants, and hotels.	Full set metals/stack test	-
(c) Metal reclamation when surface is coated with plastic material	Same as 1(a) above	Same as 1(a) above

Emitting Process, Device or Facility Activity	Substance and Type of Test	Alternative (if any)
2. Coal and coke combustion including incineration*	a. Full set metals/stack test	Small business: Fuel analysis
..	b. Hydrogen chloride/stack test	Small business: Fuel analysis
..	c. PAH/stack test	-
..	d. Dioxins/stack test	-
..	e. Formaldehyde/stack test	-
..	2.a.-e., above	Requirements 2.a.-e. shall not apply to universities, schools, colleges, hospitals, and correctional institutions where coal or coke combustion is used primarily for space heating.
3. Residual and crude oil combustion and incineration*	a. Full set metals/stack test	Small business: Fuel analysis
..	b. Metals, chloride/fuel analysis	-
..	c. Benzene/stack test	-
..	d. PAH/stack test	-
..	e. Formaldehyde/stack test	-
..	3.a.-e., above	Requirements 3.a.-e. shall not apply to universities, schools, colleges, hospitals, and correctional institutions where residual or crude oil combustion is used primarily for space heating.
4. Distillate and diesel combustion and incineration*	a. Metals, chloride/fuel analysis	-
..	b. PAH/stack test	-
..	c. Formaldehyde/stack test	-
..	d. Diesel PM (PM10) If source testing is necessary, ARB should be consulted as to the most appropriate test method.	

Emitting Process, Device or Facility Activity	Substance and Type of Test	Alternative (if any)
..	4.a.-c., above	Requirements 4.a.-c. shall not apply to universities, schools, colleges, hospitals, and correctional institutions where distillate or diesel combustion is used primarily for space heating.
..	4.a.-c., above	Requirements 4.a.-c. shall not apply to emergency or stand-by equipment that primarily burn distillate or diesel fuel.
5. Waste oil combustion and incineration* (including oil containing used, recycled, reprocessed, or re-refined oil)	a. Full set metals/stack test	Small business: Fuel analysis
..	b. Halogenated organics/stack test	-
..	c. Benzene/stack test	-
..	d. PAH/stack test	-
..	e. Dioxins/stack test	-
..	f. Formaldehyde/stack test	Small business: Not required
..	g. PCBs/stack test: required any time that dioxins are tested. PCBs that should be speciated include: PCB 77, PCB 81, PCB 105, PCB 114, PCB 118, PCB 123, PCB 126, PCB 156, PCB 157, PCB 167, PCB 169, and PCB 189, as described in the Consolidated Table of OEHHA / ARB Approved Risk Assessment Health Values, which is incorporated by reference in Appendix G.	-
6. Wood, wood waste, and agricultural waste combustion and incineration* (includes untreated and treated wood)	a. Full set metals/stack test	Small business: Fuel analysis
..	b. PAH/stack test	-
..	c. Dioxins/stack test	-

Emitting Process, Device or Facility Activity	Substance and Type of Test	Alternative (if any)
..	d. Formaldehyde/stack test	-
..	6.a.-d., above	Requirements 6.a.-d. shall not apply to universities, schools, colleges, hospitals, and correctional institutions where wood, wood waste, or agricultural waste combustion is used primarily for space heating.
7. Natural gas combustion	a. Formaldehyde/stack test for electric utilities only	-
--OTHER PROCESSES--	- -	- -
8. Waste water treatment facilities - including Publicly Owned Treatment Works (POTWs)	- -	- -
- Sludge incinerator	Same as Incinerators 1(a)	Same as Incinerators 1(a)
- Unit processes (including preliminary treatment, primary treatment, secondary treatment, basins, solids and sludge handling, filtration, and chlorination), or as proposed in the facility operator's two-step protocol required by Section IX.H. of the EICG	a. Appendix A-I listed substances/two-step test	For PFAS-related compounds, wastewater treatment facilities may propose a combination of water testing and air sampling to calculate emissions of the substances in Note 7 of this Appendix
9. Agriculture-related facilities: dust	a. Metals/Lab analysis of dust representative of fugitive dust **	Small business: Not required
10. Pharmaceutical mfg.	- -	- -
- Blender	a. Halogenated organics/ducted or as applicable in method	-
..	b. Benzene/ducted or as applicable in method	-
- Drying oven	a. Halogenated organics ducted or as applicable in method	-
..	b. Benzene/ducted or as applicable in method	-
11. Smelters and foundries	- -	- -
(a) All	a. Full set metals/stack test	Small business: Metals test/feed material analysis for As, Be, Cd, Cr(VI), Ni, Pb

Emitting Process, Device or Facility Activity	Substance and Type of Test	Alternative (if any)
..	b. Hydrogen sulfide/stack test	Small business: Not required
(b) Secondary copper smelters	a. Same as 11(a) plus dioxins/stack test	-
(c) Secondary aluminum production	--	--
- Thermal chip dryers and secondary aluminum processing units processing material other than clean charge	a. Dioxins/stack test	-
- Scrap dryers/delacquering kilns/decoating kilns, sweat furnaces	a. Dioxins/stack test	-
..	b. Hydrogen chloride/stack test	-
- In-line fluxers using reactive flux materials and secondary aluminum processing units processing clean charge	a. Hydrogen chloride/stack test	-
12. Petroleum refineries	--	--
- CO boilers	a. Benzene/as applicable in method	-
..	b. Formaldehyde/as applicable in method	-
..	c. All metals/ducted or as applicable in method	-
- Catalytic crackers	a. Benzene/as applicable in method	-
..	b. Formaldehyde/as applicable in method	-
..	c. All metals/ducted or as applicable in method	-
- Oil combustion	a. Same as appropriate oil combustion by fuel type	Same as 5 (oil combustion)
13. Asphaltic concrete production	a. Full set of metals/ducted or as applicable in method	-
..	b. Benzene/ducted or as applicable in method	-
..	c. PAH/ducted or as applicable in method	Small business: Not required

Emitting Process, Device or Facility Activity	Substance and Type of Test	Alternative (if any)
14. Cement mfg.	a. Full set of metals/stack test	-
..	b. Formaldehyde/stack test	-
..	c. Benzene/stack test	-
..	d. Dioxins/stack test ***	-
..	e. PAH/stack test ***	Small business: Not required
..	f. Hydrogen chloride/stack test***	Small business: Fuel analysis, including total chloride
15. Pulp and paper mfg.	- -	- -
- Combustion	a. All combustion, as applicable by fuel type	Same as for Combustion
- Bleaching	a. Formaldehyde/ducted or as applicable in method	-
..	b. Halogenated organics/ducted or as applicable in method	-
16. Textile mfg.		
- Combustion	a. All combustion, as applicable by fuel type	Same as for Combustion
- Other processes	a. Benzene/ducted or as applicable in method	-
..	b. Formaldehyde/ducted or as applicable in method	-
..	c. Halogenated organics/ducted or as applicable in method	-
17. Solvent recycling (re-refining)	a. Halogenated organics/ducted or as applicable in method	-
..	b. Benzene/ducted or as applicable in method	-
18. Fiberboard mfg.	a. Formaldehyde/ducted or as applicable in method	-
19. Glass mfg.	a. Arsenic/stack test	-
..	b. Cr(VI) and lead/stack test	Small business: Not required
20. Bulk plant/terminal	a. Gasoline vapors/existing compliance tests must be provided	-
21. Landfills	- -	- -

Emitting Process, Device or Facility Activity	Substance and Type of Test	Alternative (if any)
- Active areas (e.g., daily and intermediate cover), final covered areas, or as proposed in the facility operator's two-step protocol required by Section IX.H. of the EICG	a. Appendix A-I listed substances/two-step test	-
22. Composting	- -	- -
- Unit processes (including feedstock and receiving, composting, mixing, finished product, uncomposted feedstock, and fugitive emissions locations), or as proposed in the facility operator's two-step protocol required by section IX.H. of the EICG	a. Appendix A-I listed substances/two-step test	-
23. Scrap metal recycling and recovery	- -	- -
- Metal shredders	a. Appendix A-I listed substances/two-step test	-

* If co-fired with hazardous, municipal, or biomedical waste, or burning tires, then include all testing required under entry 1(a) of this table.

** Preferably dust trapped by the particulate control equipment, if any.

*** Except when burning primarily natural gas, then not required