US ERA ARCHIVE DOCUMENT

RFI PHASE II REPORT GENERAL MOTORS CORPORATION NAO FLINT OPERATIONS SITE - FLINT, MICHIGAN

				Analytical	Results Exceedin	g Part 201 Screening Criteria	
				Soil		Groundwater	
AOI ID	AOI Description	Summary of Primary Materials Managed	RFI Activities (number of samples collected)	Constituent (maximum concentration detected, mg/kg)	Screening Criteria (mg/kg)	Constituent (maximum concentration detected, mg/L)	Screening Criteria (mg/L)
Building	38 Area	, J		, 5 0,	(0 0)	, , ,	(0)
38-1	Northern portion of Building 38, including several process waste sumps, trenches, former car lifts, and a former 8,000-gallon fuel oil UST.		•Installed 6 soil borings (19) •Installed 3 monitoring wells (9) •Sampled 2 existing monitoring wells (3)	No exceedences		Beryllium (0.034) Lead (0.0065) Thallium (0.0049)	IDW (0.0040) IDW (0.0040) IDW (0.0020)
Factory		I to decorate and	Line (alle d 00 a all b aris no (400)	D (040)	110/(010/45)	4 4 Triablement (0.05)	IDM(0.00)
36-1	Northern and central portions of Building 36, involving various active engine manufacturing process, including various "wet" (i.e., use of cutting and/or cooling oils) and "dry" (i.e., no use of cutting and/or cooling oils) metal machining operations. Due to the nature of the operations (i.e., full production), it is difficult to	cooling/cutting oils,	•Installed 39 soil borings (129) •Installed 35 monitoring wells (60) •Sampled 3 existing monitoring wells (6) •Reinstalled 2 existing monitoring wells (5) •Collected 8 LNAPL samples	Benzene (240) Ethylbenzene (680) Toluene (4,100)	IISVSIC(45) ISVIA(8.4) IDC(140) ISVIA(140) IDC(250) IISVSIC(3,300) ISVIA(250)	1,1,1-Trichloroethane (0.95) 1,1-Dichloroethene (0.12) 1,2-Dichloroethane (0.0093) cis-1,2-Dichloroethene (0.15) Benzene (0.36) Trichloroethene (0.099) Vinyl chloride (0.198)	IDW(0.20) IDW(0.0070) IDW(0.0050) IDW(0.070) IDW(0.0050) IDW(0.0050) IDW(0.0020)
	visually assess whether releases have occurred.			Xylenes (total) (2,480)	IDC(150) ISVIA(150)	Arsenic (0.14) Beryllium (0.030)	IDW(0.050) IDW(0.0040)
				Arsenic (39)	IDC (37)	Cadmium (0.021)	IDW(0.0040)
				Chromium (410) Manganese (6,730)	IPSIC(240) IPSIC(1,500)	Chromium (0.22) Lead (0.022)	IDW(0.10) IDW(0.0040)
				g(2,1.2.2)		Nickel (0.13) Vanadium (0.21)	IDW(0.10) IDW(0.062)
36-2	Basement area located along the east side of the central portion of Building 36, involving a former metal chip processing operation used to separate residual cutting and cooling oils from metal machining chips. Free-floating product is located immediately downgradient of this basement area.		Installed 7 soil borings (14) Installed 3 monitoring wells (5) Sampled 3 existing monitoring wells (10) Collected 2 LNAPL samples	Chromium (450)	IPSIC(240)	1,1,1-Trichloroethane (0.24) 1,2-Dichloroethane (0.0013) Benzene (4.5) Trichloroethene (0.035) Vinyl chloride (0.0081) Arsenic (0.17) Bervllium (0.0090)	IDW(0.0050) IDW(0.0050) IDW(0.0050) IDW(0.0050) IDW(0.0020) IDW(0.0050) IDW(0.0040)
36-3	Basement area located beneath the southeastern corner of Building 36, involving a final engine assembly area, several ancillary, main process waste oil collection/processing operations, and several former USTs. The former USTs ranged in size from 300 to 12,000 gallons, and contained gasoline, diesel fuel, and/or process waste oils. Oil has been historically observed on the floor of the basement at various locations.	Process waste oils.	Installed 5 soil borings (12) Installed 5 monitoring wells (13) Collected 2 grab water samples from basement area Sampled 1 existing monitoring well (3)	No exceedences		Benzene (6.0) Ethylbenzene (1.3) Toluene (20) Beryllium (0.0081) Chromium (0.19) Vanadium (0.38)	IDW(0.0050) IDW(0.070) IDW(1.0) IDW(0.0040) IDW(0.10) IDW(0.062)
36-4	Southcentral and southwestern portions of the Building 36, involving a former "wet" (i.e., use of cutting and/or cooling oils) metal machining operation and several active engine assembly operations. Trenches associated with these operations routinely contain standing oil, and the integrity of such trenches is unknown.	Cooling/cutting oils, and process waste oils.	•Installed 2 soil borings (5) •Installed 2 monitoring wells (2)	No exceedences		No exceedences	

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36-5	Area located immediately south of AOI 36-5 involving a former UST farm and active AST farm, as well as a 6' wide x 6' high subsurface tunnel which connected the former UST farm with Building 36. The ASTs and former USTs range(d) in size from 6,000 to 15,000 gallons, and contain(ed) gasoline, motor oil, hydraulic oil, mineral seal oil, naphtha, and various cooling/cutting oils. A prior release(s) from the UST farm in this area has been documented, and floor staining has been observed in the tunnel.	Gasoline, motor oil, hydraulic oils, and solvents.	Installed 2 soil borings (5) Installed 2 monitoring wells (8) Sampled 4 existing monitoring wells (9) Replaced 1 existing monitoring well (1) Collected 4 LNAPL samples	No exceedences		Trichloroethene (0.044) Vinyl chloride (0.014) Beryllium (0.0069) Manganese (3.7) Nickel (0.17)	IDW(0.0050) IDW(0.0020) IDW(0.0040) IDW(2.5) IDW(0.10)
Building	s 55, 55A, and 55B Area	<u>!</u>	!	!	!		1
55-1	Overall area of the Site's process wastewater treatment facilities, involving various waste oil storage facilities, clarifiers, mixing tanks, etc. Past investigations of this area have indicated impacts to underlying soil and groundwater, presumably resulting from a release(s) from these facilities.	Process waste oils.	•Installed 13 soil borings (27) •Installed 6 monitoring wells (16) •Sampled 6 existing monitoring wells (19)	No exceedences		1,2-Dichloropropane (0.14) Benzene (0.018) Trichloroethene (0.107) Vinyl chloride (0.028) bis(2-chloroethyl)ether (0.026) Arsenic (0.086) Antimony (0.013) Beryllium (0.61) Cadmium (0.016) Chromium (8.2) Cyanide (1.1) Lead (0.025) Manganese (2.9) Nickel (0.13) Thallium (0.0041)	IDW(0.0050) IDW(0.0050) IDW(0.0050) IDW(0.0050) IDW(0.0083) IDW(0.0060) IDW(0.0060) IDW(0.0040) IDW(0.0050) IDW(0.0050) IDW(0.0050) IDW(0.20) IDW(0.20) IDW(0.55) IDW(0.10) IDW(0.501) IDW(0.501) IDW(0.501) IDW(0.501) IDW(0.501)
Factory	10 Area			•	· •	(2.22)	1 (/
10-1	Overall area of Building 20, including its basement areas, manufacturing operations, external areas immediately surrounding the building, and several existing and former ASTs ranging in size from 1,000 to 20,000 gallons. The ASTs contain(ed) various lubricating oils, automatic transmission fluid, solvents, and process waste oils. Past investigations of the Building 20 Area have indicated impacts to underlying soil and groundwater resulting from releases from associated operations.	Hydraulic oils and process waste oils.	Installed 6 soil borings (15) Installed 1 monitoring well (3) Sampled 4 existing monitoring wells (8) Collected 2 LNAPL samples	Arsenic (40) Chromium (750) Lead (2,200) Manganese (3,000)	IDC (37) IPSIC(240) IDC(900) IPSIC(1,500)	1,1,1-Trichloroethane (0.21) 1,1-Dichloroethene (0.013) cis-1,2-Dichloroethene (0.25) Vinyl chloride (0.0032) Barium (33) Lead (0.0088)	IDW(0.20) IDW(0.0070) IDW(0.070) IDW(0.0020) IDW(2.0) IDW(0.0040)

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10-2	Solid waste transfer station located east of Building 20 and south of Buildings 22 and 24. Two 200,000-gallon ASTs containing process waste oils and #2 fuel oil were formerly present in this area. Residual oil draining from solid waste stored in the solid waste transfer station occasionally collects on the concrete pavement of this area, which has numerous cracks and fissures. Residual oil is recovered via a centrally located pit that is routinely emptied.	Process waste oils.	•Installed 18 soil borings (35) •Installed 15 monitoring wells (34)	Manganese (1,800)	IPSIC (1,500)	1,1,1-Trichloroethane (0.58) 1,1-Dichloroethene (0.11) Benzene (0.017) Chloroethane (3.3) cis-1,2-Dichloroethene (0.15) Methylene chloride (0.029) Trichloroethene (0.16) Vinyl chloride (0.060) Arsenic (0.068) Lead (0.0068) Manganese (7.6)	IDW(0.20) IDW(0.0070) IDW(0.0050) IDW(1,0.70) IDW(0.0050) IDW(0.0050) IDW(0.0050) IDW(0.0050) IDW(0.0050) IDW(0.0050) IDW(0.0050) IDW(0.0050) IDW(0.050) IDW(0.050) IDW(0.050)	
10-3	Basement area of Building 22, including a 200- gallon AST which contained diesel fuel and two process waste oil sumps which collect oil leaks from compressors via floor drains, and the area immediately north of Building 22 (formerly used to manufacture Liberty Aircraft engines and more recently to store scrap USTs and ASTs following removal).	process waste	Installed 14 soil borings (20) Installed 7 monitoring wells (13) Reinstalled 2 existing monitoring wells (5) Sampled 1 existing monitoring well (3)	Manganese (2,500)	IPSIC(1,500)	1,1,1-Trichloroethane (2.4) 1,1-Dichloroethane (12) 1,1-Dichloroethane (0.13) 1,2-Dichloroethane (0.017) Chloroethane (7.4) Vinyl chloride (0.280) Beryllium (0.042) Lead (0.0049)	IDW(0.20) IDW(2.5) IDW(0.0070) IDW(0.0050) IDW(1.7) IDW(0.0020) IDW(0.0040) IDW(0.0040)	
	Scrapyard area located immediately south of Building 20 used since 1950 for scrap material storage, vehicle dismantling, and vehicle equipment storage. Past investigations of this area have indicated impacts to underlying soil and groundwater resulting from releases from associated operations.	Process waste oils, cooling/cutting oils, and transmission and hydraulic oils.	Installed 1 soil boring (1) Installed 1 monitoring well (5) Sampled 5 existing monitoring wells (10) Reinstalled 1 existing monitoring wells (1) Collected 3 LNAPL samples	No exceedences		Benzene (0.0061) Vinyl chloride (0.0023)	IDW(0.0050) IDW(0.0020)	
Factory	05 Area	I .			1	1	· I	
	Basement area located along the southeast portion of Building 43, involving a metal machining chip processing operation and several process wastewater system sumps and tanks. Free-floating product is located immediately adjacent to this basement area.	oils, and other process waste	Installed 7 soil borings (15) Installed 3 monitoring wells (2) Sampled 4 existing monitoring wells (6) Collected 3 LNAPL samples	Lead (3,100) Manganese (2,400)	IDC(900) IPSIC(1,500)	No exceedences		
05-2	Central east portion of Building 43, involving a "Filtration Room," an "Oil Room," a belowgrade vault, and an elevator pit. Over 2 feet of oil material has been noted on occasion within the below-grade vault in this area. The source of this material is unknown; however, it may be associated with the adjacent Oil Room and/or Filtration Room.	Process waste oils.	Installed 2 soil borings (5) Installed 2 monitoring wells (5) Sampled 2 existing monitoring well (4)	No exceedences		Trichloroethene (0.095) Vinyl chloride (0.019) Beryllium (0.0056) Nickel (0.21)	IDW(0.0050) IDW(0.0020) IDW(0.0040) IDW(0.10)	

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05-3	Basement area of Building 43 beneath transmission component heat treating operations, containing a relatively large process waste oil sump, various other smaller sumps and drains, and intermittent pooling of oil on floor surfaces. Several former and existing ASTs and USTs are/were located along the east side of the building adjacent to the basement area. These ASTs and USTs ranged in size from 275 to 12,000 gallons, and contained quench oils, hydraulic oils, lubricating oils. qasoline. and diesel fuel.		Installed 4 soil borings (11) Installed 4 monitoring wells (8) Reinstalled 1 existing monitoring well (2) Sampled 1 existing monitoring well (1)	No exceedences		Trichloroethene (0.029) Arsenic (0.084)	IDW(0.0050) IDW(0.050)		
	"Cold Former Room," involving various metal forming operations utilizing various process oils and other fluids and recirculation trenches and sumps.	Process waste oils.	•Installed 1 soil boring (3) •Installed 1 monitoring well (1) •Sampled 1 existing monitoring well (1)	No exceedences		No exceedences			
05-5	Northern portion of Building 43, involving various active process machinery, collection trenches, and sumps (both "wet" and "dry" operations). Due to the nature of the operations (i.e., full production), it is difficult to visually assess whether releases have occurred.	Cooling/cutting oils, process waste oils, and solvents.	Installed 5 soil borings (13) Installed 5 monitoring wells (7) Installed 1 piezometer (0) Reinstalled 1 piezometer (1) Sampled 1 existing monitoring well (1) Collected 4 LNAPL samples	No exceedences		Arsenic (0.070) Nickel (0.22)	IDW(0.050) IDW(0.10)		
	Southern portion of Building 43, involving various active process machinery, collection trenches, and sumps (both "wet" and "dry" operations). Due to the nature of the operations (i.e., full production), it is difficult to visually assess whether releases have occurred. This AOI also includes the area south of Building 43 in the vicinity of Building 99.	Cooling/cutting oils, process waste oils, and solvents.	•Installed 12 soil borings (21) •Installed 4 monitoring wells (11) •Installed 1 piezometer (0) •Reinstalled 1 monitoring well (2) •Sampled 4 existing monitoring wells (8)	Lead (3,500)	IDC(900)	cis-1,2-Dichloroethene (0.081) Trichloroethene (0.26) Vinyl chloride (0.019) Manganese (3.1)	IDW(0.070) IDW(0.0050) IDW(0.0020) IDW(2.5)		
Factory									
03-1	Overall area of the Factory 03 building complex, including various quenching and cooling oil systems utilized for various metal forging, quenching, and cooling operations, as well as various ancillary process waste sumps, process trenches, elevator pits, and process material storage areas. Past investigations of this area have indicated impacts to underlying soil and groundwater resulting from releases from associated operations.	Hydraulic oils, quench oils, and process waste oils.	•Installed 15 soil borings (21) •Installed 5 monitoring wells (7) •Reinstalled 2 existing monitoring wells (1) •Sampled 7 existing monitoring wells (12) •Collected 1 LNAPL sample	Benzo(a)pyrene (15) Manganese (4,700)	IDC(8.0) IPSIC(1,500)	Trichloroethene (0.064) Vinyl chloride (0.0091) Arsenic (0.090) Beryllium (0.043) Selenium (0.19)	IDW(0.0050) IDW(0.0020) IDW(0.050) IDW(0.0040) IDW(0.050)		

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Factory	81 Area						
81-1	Basement area beneath the southern and central portions of Building 71B, involving former foundry operations and three metal machining chip/cooling and cutting oil filtration/processing operations, as well as an inactive hydraulic elevator, several process waste oil sumps and tanks, a drum storage area, and an inactive hazardous waste storage area. Oils intermittently pool throughout the basement area.	and process waste oils.	•Installed 11 soil borings (12) •Installed 2 monitoring wells (6) •Installed 2 temporary wells (2)	Lead (69,000)	IDC(900) IPSIC(44,000)	Vinyl chloride (0.012) Arsenic (0.091) Lead (0.010)	IDW(0.0020) IDW(0.050) IDW(0.0040)
81-2	Area of active metal welding and machining and torque converter assembly operations performed in Buildings 70, 70B, 71, 72, 73, 73A, 73B, and 74 (both "wet" and "dry" operations), as well as area of former foundry operations performed in northern portion of Building 70 and areas of former "pig iron" and scrap steel storage immediately east of Buildings 70 and 73, respectively. Free-floating product is located immediately adjacent to Building 73.	process waste oils, and oil- impregnated foundry sand.	Installed 22 soil borings (33) Installed 7 monitoring wells (8) Installed 2 temporary wells (2) Sampled 4 existing monitoring wells (11) Reinstalled 1 existing monitoring wells (1) Collected 2 LNAPL samples	1,1,1-Trichloroethane (47,000) 1,1-Dichloroethane (7,000) 1,1-Dichloroethane (10) Trichlorotrifluoroethane (64,000) Arsenic (56)	IDC(460) ISVIA(460) ISVIA(460) ISVIA(430) ISVSIC(2,500) ISVIA(0.33) IISVSIC(3.7) IDC(550) ISVIA(550) IDC(37)	Lead (0.055) Manganese (3.2)	IDW(0.0040) IDW(2,0.0500)
	Building 73.			Lead (3,100)	IDC(900)		
				Manganese (1,800)	IPSIC(1,500)		
81-2	Area of active metal welding and machining	Hydraulic oils,	Installed 22 soil borings (33) Installed 7 monitoring wells (8) Installed 2 temporary wells (2) Sampled 4 existing monitoring wells (11) Reinstalled 1 existing monitoring wells (1)	1,1,1-Trichloroethane (47,000) 1,1-Dichloroethane (7,000)	IDC(460) ISVIA(460) IDC(890) ISVIA(430) IISVSIC(2,500)	Lead (0.055) Manganese (3.2)	IDW(0.0040) IDW(2,0.0500)
			Collected 2 LNAPL samples	1,1-Dichloroethene (10)	ISVIA(0.33) IISVSIC(3.7)	_	
				Trichlorotrifluoroethane (64,000) Arsenic (56) Lead (3,100) Manganese (1,800)	IDC(550) ISVIA(550) IDC(37) IDC(900) IPSIC(1,500)		
81-3	Basement area of Building 70, involving former	Hydraulic oils,	Installed 7 soil borings (18)	No exceedences		cis -1,2 Dichlorethene (0.162)	IDW (0.07)
	foundry operations, as well as an elevator pit along the west side of Building 70A, areas of "wet" metal machining operations in eastern portion of Building 73, and a forklift battery charging area in the northwest portion of Building 69. Floor staining noted within basement area; the integrity of basement floor is unknown.	, process waste	Installed 5 monitoring wells (13) Installed 1 temporary well (1) Reinstalled 1 monitoring well (2) Sampled 1 existing monitoring well (4)			Trichloroethene (0.032) Vinyl chloride (0.065) Barium (2.5) Cadmium (0.0098) Lead (0.047) Manganese (3.3) Nickel (0.24) Zinc (6.0)	IDW(0.0050) IDW(0.0020) IDW(2.0) IDW(0.0050) IDW(0.0040) IDW(2.5) IDW(0.10) IDW(5.0)

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81-4	Basement areas of Buildings 69A and 69B, involving facility air compressor operations. Past operations within this basement involved the draining of oils from compressors onto the floor; the integrity of basement floor is unknown.	Compressor oils.	•Installed 1 soil boring (4) •Installed 1 monitoring well (4)	No exceedences		Tetrachloroethene (0.011)	IDW(0.0050)
81-5	A containment area for several existing and former ASTs. The ASTs range(d) in size from 2,500 to 20,000 gallons, and contain(ed) diesel fuel and automatic transmission fluid. The concrete secondary containment area associated with these tanks contain standing transmission fluid, and the integrity of this containment is unknown.	Automatic transmission fluids, fuel oils.	Installed 1 soil boring (3) Installed 1 temporary well (1) Installed 1 temporary well (1)	No exceedences		No exceedences	
	s 21 and 97 Area	1					
21-1	Overall area of Building 21 and area immediately to the southeast of Building 21, involving former metal machining chip briquetting operations and current metal welding and tool grinding operations and heat treatment laboratories. The former briquetting operations purportedly involved the release of oils to soil surfaces in this area.	Cooling/cutting oils.	 Installed 4 soil borings (9) Installed 1 monitoring well (4) Installed 3 temporary wells (3) 	No exceedences		Trichloroethene (0.012) Vinyl chloride (0.0032) Pentachlorophenol (0.0021) Manganese (9.2)	IDW(0.0050) IDW(0.0020) IDW(0.0010) IDW(0.0500)
Building	65 Area			-	<u> </u>	1	<u> </u>
	Overall area of Building 65, involving a main process waste pump station (Waste Station #5) for the Site's process wastewater treatment system. Oil has been historically observed on the floor of the basement at various locations.	Process waste oils.	Installed 1 soil boring (2) Installed 1 monitoring well (3)	No exceedences		Trichloroethene (0.046)	IDW(0.0050)
	83/84 Area						
	Areas of various former and existing machining operations in Buildings 11, 32 (including two basements), and 66A/66D (both "wet" and "dry" operations). A prior release within Building 32 has been documented.	process waste oils.	•Installed 3 soil borings (6) •Installed 2 monitoring wells (4)	No exceedences		No exceedences	
83/84-2	Areas of various former and existing machining operations in Buildings 11, 32 (including two basements), and 66A/66D (both "wet" and "dry" operations). A prior release within Building 32 has been documented.	process waste	•Installed 24 soil borings (53) •Installed 6 monitoring wells (8) •Collected 4 LNAPL samples	Benzo(a)anthracene (81) Benzo(a)pyrene (66) Dibenz(a,h)anthracene(17) Arsenic (47) Chromium (2,400) Lead (6,500) Manganese (3,500)	IDC(80) IDC(10) IDC(8.0) IDC(37) IPSIC(240) IDC(900) IPSIC(1,500)	cis-1,2-Dichloroethene (0.075) Vinyl chloride (0.069) Arsenic (0.10) Beryllium (0.023)	IDW(0.070) IDW(0.0020) IDW(0.050) IDW(0.0040)

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83/84-3	Areas of various former and existing machining operations in Buildings 11, 32 (including two basements), and 66A/66D (both "wet" and "dry" operations). A prior release within Building 32 has been documented.	process waste	Installed 13 soil borings (16) Installed 1 monitoring well (3) Installed 1 temporary well (1) Sampled 1 existing monitoring well (1)	Lead (42,000)	IDC(900)	Beryllium (0.011) Lead (0.020)	IDW(0.0040) IDW(0.0040)
	Former "wet" metal machining operation in central portion of Building 66, including three process oil collection/recirculation sumps, and an inactive rail loading area and associated floor sumps along the north side of Building 66C. The floor of the loading area is saturated with oil, and the associated floor sumps still contain oil (integrity unknown).	oils.	Installed 11 soil borings (22) Installed 1 temporary well (1) Installed 8 monitoring wells (3) Collected 4 LNAPL samples	No exceedences		Arsenic (0.11) Beryllium (0.14) Lead (0.0081)	IDW(0.050) IDW (0.004) IDW(0.0040)
83/84-5	Various inactive or former process trenches and pits and an inactive heat treating tunnel, all in Building 66. Many of these units still contain various oils and/or other process fluids, and the integrity of these units is unknown.	oils.	•Installed 1 soil boring (2) •Installed 1 temporary well (1) •Sampled 1 existing monitoring well (1)	No exceedences		No exceedences	
	Forklift battery charging area and associated trench and pit in central portion of Building 83A (contain oil) and drum storage area in the southern portion of Building 83 used for metalworking fluids and corrosion inhibitors (floor staining).		Installed 1 soil boring (3)	Benzo(a)pyrene (8.3)	IDC(8.0)	No samples collected	
	An area of several former USTs ranging in size from 3,000 to 12,000 gallons that contained gasoline, various cooling/cutting oils, quench oils, and lubricating oils. A prior release(s) from these tanks has been documented. s 15, 61, 61A, and 85 Area	lubricants, quench oil, thinners.	•Installed 1 soil boring (2) •Installed 1 monitoring well (4) •Sampled 4 existing monitoring wells (9)	No exceedences		Benzene (0.16) cis-1,2-Dichloroethene (0.088) Toluene (2.3) Trichloroethene (0.035) Vinyl chloride (0.15)	IDW(0.0050) IDW(0.070) IDW(1.0) IDW(0.0050) IDW(0.0020)
	<u> </u>	Hudroulio and	alpatallad 7 apil harings (20)	No avanadanasa	ı	Tatrachlaraethana (0.022)	IDW/(0.00E0)
	Elevator pit along the north-central side of Building 85, trenches related to engine test area in the eastern portion of Building 85, and a basement/vault area toward the center of Building 85. The integrity of these units is unknown.	process waste oils.	•Installed 7 soil borings (20) •Installed 7 monitoring wells (9) •Installed 1 temporary well (1) •Reinstalled 2 monitoring wells (4) •Collected 1 LNAPL sample	No exceedences	-	Tetrachloroethene (0.022) Trichloroethene (0.093) Beryllium (0.0070) Selenium (0.080) Vanadium (0.13)	IDW(0.0050) IDW(0.0050) IDW(0.0040) IDW(0.050) IDW(0.062)

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AOI ID	AOI Description	Summary of Primary Materials Managed	RFI Activities (number of samples collected)	Constituent (maximum concentration detected, mg/kg)	Screening Criteria (mg/kg)	Constituent (maximum concentration detected, mg/L)	Screening Criteria (mg/L)
Building	s 86 and 86A Area	*					
86-1	Overall area of Building 86 and areas immediately southeast and west of Building 86, collectively involving a hazardous waste drum storage area, a process waste oil pump station (integrity unknown), a waste transport vehicle storage area (pavement staining; integrity unknown), a former 6,000-gallon UST containing gasoline, and a former UST farm which contained tanks ranging in size from 2,000 gallons to 12,000 gallons. The former USTs contained diesel fuel, mineral seal, and various cooling/cutting, and lubricating oils.	Gasoline and process waste and other oils.	•Installed 18 soil borings (36) •Installed 11 monitoring wells (19) •Installed 2 temporary wells (2) •Reinstalled 2 monitoring wells (11) •Sampled 5 existing monitoring wells (11) •Collected 3 LNAPL samples	Arsenic (190) Manganese (3,200)	IDC(37) IPSIC(1,500)	1,1-Dichloroethene (0.027) 1,2-Dichloroethane (0.0054) Benzene (0.0079) Chloroethane (14) cis-1,2-Dichloroethene (0.045) Methylene chloride (0.0093) Tetrachloroethene (0.041) Trichloroethene (2.0) Vinyl chloride (0.43) Beryllium (0.0098) Lead (0.010) Manganese (2.8)	IDW(0.0070) IDW(0.0050) IDW(0.0050) IDW(1.7) IDW(0.070) IDW(0.0050) IDW(0.0050) IDW(0.0050) IDW(0.0020) IDW(0.0040) IDW(0.0040) IDW(2.5)
	07 Area	•		•	•	•	•
07-1	Former coal yard immediately north of Building 07 (unlined) and several other process facilities (e.g., waste sludge dump station and waste sludge storage tanks) along north side of Building 07 (integrity unknown).		Installed 8 soil borings (14) Installed 2 monitoring wells (1) Installed 2 temporary wells (2) Reinstalled 1 monitoring well (1) Sampled 1 existing monitoring well (3)	No exceedences		Vinyl chloride (0.0033)	IDW(0.0020)
07-2	Inactive lime "Slaker House" and adjacent inactive lime slurry tank adjacent to the southwest corner of Building 07 (integrity unknown).	Caustics.	•Installed 1 soil boring (3)	No exceedences		No sample collected	-
07-3	Two elevator pits in the northcentral and southcentral portions of Building 07 and bulk sulfuric acid storage area in the southeast corner of Building 07 (integrity unknown).	Hydraulic oils and caustics.	Installed 3 soil borings (8) Installed 1 monitoring well (3) Installed 1 temporary well (2) Sampled 1 existing monitoring well (1)	No exceedences		Beryllium (0.016)	IDW(0.0040)
	s 03, 17, 28, 84, and 94 Area	D	-landallad O anil havings (4)	Niconordana	_	Idi a Distributa data (0.042)	CCI(0.0007)
94-A	Building 94 (southeast) sumps and trenches		Installed 2 soil borings (4) Installed 1 temporary well (1) Installed 1 monitoring well (2)	No exceedences	-	di-n-Butylphthalate (0.013) Cyanide (0.0053)	GSI(0.0097) GSI(0.0052)
94-B	Building 94 (northeast) sump and trench	and battery acids	Installed 5 soil borings (9) Installed 5 monitoring wells (6) Reinstalled 1 monitoring well (4)	No exceedences		1,1-Dichloroethene (0.0075) Trichloroethene (0.95)	IDW(0.0070) IDW(0.0050) GSI(0.20)
94-C	Building 94 (central) sumps, trenches, lifts	,	•Installed 2 soil borings (4) •Installed 2 temporary wells (2)	No exceedences		Arsenic (0.052)	IDW(0.050)
94-D	Building 94A elevator pit	Hydraulic oils	•Installed 1 soil boring (4) •Installed 1 monitoring well (1)	No exceedences		No exceedences	
94-E	Building 03 car loading area	Hydraulic oils	•Installed 1 soil boring (2) •Installed 1 temporary well (1)	No exceedences		No exceedences	

RFI PHASE II REPORT GENERAL MOTORS CORPORATION NAO FLINT OPERATIONS SITE - FLINT, MICHIGAN

				Analytical	Results Exceedir	ng Part 201 Screening Criteria	
				Soil		Groundwater	
		Summary of		Constituent (maximum	Screening	Constituent (maximum	Screening
AOI		Primary Materials	RFI Activities	concentration	Criteria	concentration	Criteria
ID	AOI Description	Managed	(number of samples collected)	detected, mg/kg)	(mg/kg)	detected, mg/L)	(mg/L)
84-A	Building 84 (south) pits, sumps, and lifts	Hydraulic oils,	Installed 3 soil borings (7)	No exceedences		Cyanide (0.071)	GSI(0.020)
		process waste	Installed 1 monitoring well (0)			Silver (0.00024)	GSI(0.00020)
			Installed 2 temporary wells (2)				
			•Reinstalled 1 monitoring well (4)				
84-B	Building 84 (central) pits, sumps, basement	Hydraulic oils and	Installed 1 soil boring (3)	No exceedences		No exceedences	
		process waste oils	Installed 1 temporary well (2)				
84-C	Building 84 (north) pits, sumps, trenches	Process waste	Installed 1 soil boring (3)	No exceedences		No exceedences	
		oils, waste	Installed 1 temporary well (1)				
84-D	Former Building 84 Tank Farm	New and waste	Installed 21 soil boring (23)	No exceedences		Benzene (1.44)	IDW(0.005)
		product gasoline,	Installed 20 monitoring well (26)			1,1 Dichloerthene (0.008)	IDW(0.007)
			•Reinstalled 1 monitoring well (2)			cis 1,2-Dichloethene (0.332)	IDW(0.07)
			•Sampled 2 existing monitoring wells (3)			Trichoroethene (0.258)	IDW(0.005)
						Vinyl chloride (0.124)	IDW(0.0020)
						Beryllium (0.26)	IDW(0.004)
						Chromium (0.45)	IDW(0.10)
						Nickel (0.91)	IDW(0.10)
17-A	Building 17 elevator pit	Hydraulic oils	Installed 2 soil borings (4)	No exceedences		Antimony (0.0043)	GSI(0.0050)
		,,,	Installed 1 monitoring well (5)			Selenium (0.011)	GSI(0.0050)
			•Installed 1 temporary well (1)			Silver (0.00045)	GSI(0.00020)
Building	ıs 02, 12, 23, and 29 Area		motaned recomposary men (1)		<u>.</u>	G (6.655 15)	(0.00020)
02-A	Building 02 sump	Process waste oils	Installed 1 soil boring (2)	No exceedences		No exceedences	
			Installed 1 temporary well (1)				
02-B	Building 02 elevator pit	Hydraulic oils	Installed 2 soil borings (19)	No exceedences		Acetone (47)	IDW(2.1)
			Installed 1 temporary well (1)			Manganese (3.0)	IDW(2.5)
			Installed 11 monitoring well (9)				` ′
02-C	Building 02 sump	Laboratory	Installed 4 soil borings (6)	Lead (2,000)	IDC(900)	No exceedences	
		chemicals	Installed 1 temporary well (2)	Chromium (390)	IPSIC(270)		
02-D	Building 02 machine pit	Hydraulic oils	Installed 1 soil boring (3)	No exceedences		No exceedences	
			Installed 1 temporary well (1)				
02-E	Former Tank 66	Gasoline	Installed 1 soil boring (2)	No exceedences		No exceedences	
			Installed 1 monitoring well (2)				
02-F	Building 02 hydraulic oil AST	Hydraulic oils	Installed 3 soil borings (8)	No exceedences		Manganese (3.7)	IDW(2.5)
		,	Installed 2 monitoring wells (5)				` '
23-A	Building 23 basement process waste station	Process waste oils	Installed 2 soil borings (3)	No exceedences		No exceedences	
			Installed 2 monitoring wells (2)				
			•Reinstalled 2 monitoring wells (4)				
			•Collected 1 grab water sample from the				
			basement area				
			•Collected 1 LNAPL sample from the basement				
			area				
29-A	Elevator pit, floor staining	Hydraulic oils and	•Installed 3 soil borings (4)	Lead (1,500)	IDC(900)	No exceedences	
	1 ,,		•Installed 1 temporary well (1)	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	- (/		
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RFI PHASE II REPORT GENERAL MOTORS CORPORATION NAO FLINT OPERATIONS SITE - FLINT, MICHIGAN

				Analytical	Results Exceedir	ng Part 201 Screening Criteria	
				Soil		Groundwate	r
AOI		Summary of Primary Materials		Constituent (maximum concentration	Screening Criteria	Constituent (maximum concentration	Screening Criteria
ID	AOI Description	Managed	(number of samples collected)	detected, mg/kg)	(mg/kg)	detected, mg/L)	(mg/L)
12-A	Building 12 basement		Installed 24 soil borings (57)	Chromium (360)	IPSIC(260)	Tetrachloroethene (0.0057)	IDW(0.0050)
		and hydraulic oils	•Installed 6 temporary wells (5)	Lead (11,000)	IDC(900)	Vinyl chloride (0.040)	IDW(0.0020)
			•Installed 15 monitoring wells (11)	Manganese (2,200)	IPSIC(1,500)	Arsenic (0.06)	IDW(0.050)
			•Reinstalled 4 monitoring wells (0)			Beryllium (0.27)	IDW(0.004)
			•Sampled 1 existing monitoring well (1)			Cadmium (0.067)	IDW(0.005)
			Collected 1 LNAPL sample			Chromium (0.12)	IDW(0.12)
			Collected 1 grab water sample from the			Lead (0.059)	IDW(0.002)
			basement area			Thallium (0.0036)	IDW(0.002)
						Vanadium (0.14)	IDW(0.062)
12-B	Building 12 truck well sump	Process waste oils	•Installed 6 soil borings (10)	Manganese (1,900)	IPSIC(1,500)	No exceedences	
		and grease	Installed 1 temporary well (1)				
			Installed 6 monitoring wells (2)				
			Collected 3 LNAPL samples				
12-C	Building 12 fork truck charging area		•Installed 1 soil boring (2)	No exceedences		Vanadium (0.076)	IDW(0.062)
		and battery acids	Installed 1 temporary well (1)				
12-D	Building 12 abandoned utility tunnel	Process waste oils	•Installed 1 soil boring (2)	No exceedences		No exceedences	
			Installed 1 temporary well (1)				
	s 04, 08, 16, 40, and 44 Area		T	1			T
04-A	Process waste room		•Installed 1 soil boring (2)	No exceedences		cis-1,2-Dichloroethene (0.13)	IDW(0.070)
		and other fluids	•Installed 1 temporary well (1)			Trichloroethene (0.059)	IDW(0.0050)
04-B	Elevator pits	Hydraulic oils	•Installed 2 soil borings (5)	No exceedences		No exceedences	
			•Installed 2 temporary wells (2)				
04-C	Elevator pit	Hydraulic oils	•Installed 1 soil boring (3)	No exceedences		No exceedences	
			•Installed 1 temporary well (1)				
04-D	Waste thinner tanks	Solvents and	•Sampled 5 existing monitoring wells (7)	No samples collected		No exceedences	
40.4	En la cue	thinners	Leadalla del acilibrata y (0)				
16-A	Fluid filling station	Gasoline,	•Installed 1 soil boring (3)	No exceedences		No exceedences	
		and other oils	•Installed 1 monitoring well (2)				
40 D	Clauster wit		•Installed 1 soil boring (3)	No avecadance		No succedences	
16-B	Elevator pit	Hydraulic oils	Installed 1 soli boiling (3)	No exceedences		No exceedences	-
16-C	Former USTs	Fred brodenic	•Installed 22 soil borings (26)	No averagence	_	Benzene (0.21)	IDW(0.0050)
16-0	Former US1S	Fuel, hydraulic, and transmission	Installed 22 soil borings (26) Installed 10 monitoring wells (16)	No exceedences		Beryllium (0.044)	IDW(0.0050)
		oils	•Installed 2 temporary wells (2)			Selenium (0.18)	IDW(0.050)
		Olis	•Collected 4 LNAPL samples			Selemum (0.16)	(0.050)
16-D	UST and sump	Gasalina process	•Installed 1 soil boring (2)	No exceedences		No exceedences	
ט-טי	Oor and sump	waste oils	Installed 1 soli boiling (2)	140 exceedences	==	INO exceedences	
40-A	USTs 67 through 74	Gasoline	•Installed 1 temporary well (1)	Benzo(a)pyrene (36)	IDC(8.0)	Benzene (5.5)	IDW(0.0050)
40-A	Joors of unough 74	Gasonile	•Installed 6 monitoring wells (9)	Donzo(a)pyrene (30)	100(0.0)	Ethylbenzene (0.80)	IDW(0.0030)
			•Reinstalled 3 existing monitoring wells (6)			Arsenic (0.44)	IDW(0.70)
			Installed 1 temporary well (1)			Beryllium (0.19)	IDW(0.0040)
			•Sampled 3 existing monitoring wells (8)			Cyanide (0.44)	IDW(0.0040)
			Campied 5 existing monitoring wells (6)			Lead (0.0064)	IDW(0.20)
<u> </u>	1		1			Loau (0.0004)	1011(0.0040)

				Analytical	Results Exceeding	g Part 201 Screening Criteria	
				Soil		Groundwater	
AOI ID	AOI Description	Summary of Primary Materials Managed	RFI Activities (number of samples collected)	Constituent (maximum concentration detected, mg/kg)	Screening Criteria (mg/kg)	Constituent (maximum concentration detected, mg/L)	Screening Criteria (mg/L)
40-B	Elevator pit	Hydraulic oils	•Installed 2 soil borings (4) •Installed 2 monitoring wells (2) •Reinstalled 1 monitoring well (1)	No exceedences		cis-1,2-Dichloroethene (0.093) Trichloroethene (0.10) Vinyl chloride (0.0078)	IDW(0.0070) IDW(0.0050) IDW(0.0020)
40-C	Elevator pit	Hydraulic oils	•Installed 2 soil borings (4) •Installed 2 monitoring wells (4)	No exceedences		Trichloroethene (0.12) Vinyl chloride (0.0030) Beryllium (0.0052)	IDW(0.0050) IDW(0.0020) IDW(0.0040)
40-D	Building 40 tunnel	Process waste and hydraulic oils	•Installed 2 soil borings (6) •Installed 1 monitoring well (2) •Reinstalled 1 existing monitoring well (4) •Sampled 5 existing monitoring wells (10) •Collected 1 grab water sample from basement/tunnel area	No exceedences		Vinyl chloride (0.0058) Lead (0.0092)	IDW(0.0020) IDW(0.0040)
44-A	Building 44	Acids, caustics, hydraulic oils,	Installed 10 soil borings (19)Installed 3 monitoring wells (7)	Manganese (5,000)	IPSIC(1,500)	Benzo(a)anthracene (0.014)	IDW(0.0085) GCC(0.0094)
		paints and thinners, solvents, -Reinstalled 1 monitoring well (1)			Benzo(a)pyrene (0.015)	IDW(0.0050) GCC(0.0050)	
		and process waste oils	•Sampled 3 existing monitoring wells (5)			Benzo(b)fluoranthene (0.016)	IDW(0.0050) GCC(0.0050)
						Benzo(g,h,i)perylene (0.0079)	IDW(0.0050) GCC(0.0050)
						Benzo(k)fluoranthene (0.014)	IDW(0.0050) GCC(0.0050)
						Chrysene (0.016)	IDW(0.0050) GCC(0.0050)
						Indeno(1,2,3-cd)pyrene (0.0079)	IDW(0.0050) GCC(0.0050)
						Total PCBs (0.0011) Antimony (0.042) Chromium (0.38) Lead (0.075) Nickel (0.51) Selenium (0.052)	IDW(0.00050) IDW(0.0060) IDW(0.10) IDW(0.0040) IDW(0.10) IDW(0.050)
	09 Area						
09-A	Building 09 area	Waste oils and other run-off materials from vehicle and equipment maintenance; fuel oils	Installed 29 soil borings (55) Installed 8 monitoring wells (11) Installed 2 temporary wells (2) Reinstalled 2 monitoring wells (7) Sampled 3 existing monitoring wells (9) Collected 1 LNAPL sample	Benzo(a)pyrene (57) Dibenzo(a,h)anthracene (11) Lead (120,000) Manganese (8,300)	IDC(10) IDC(10) IDC(900) IPSIC(44,000) IPSIC(1,500)	Trichloroethene (0.184) Vinyl chloride (0.0038) Antimony (0.016) Lead (0.026)	IDW(0.0050) IDW(0.0020) IDW(0.0060) IDW(0.0040)

				Analytical Results Exceeding Part 201 Screening Criteria				
				Soil		Groundwater		
AOI ID	AOI Description	Summary of Primary Materials Managed	RFI Activities (number of samples collected)	Constituent (maximum concentration detected, mg/kg)	Screening Criteria (mg/kg)	Constituent (maximum concentration detected, mg/L)	Screening Criteria (mg/L)	
09-B	Former Building 31/Hamilton Avenue Tank Farm		•Installed 26 soil borings (51) •Installed 21 monitoring wells (44) •Installed 1 temporary well (1) •Sampled 6 existing monitoring wells (16) •Collected 2 LNAPL samples	Benzo(a)pyrene (13) Lead (1,200) Manganese (1,800)	IDC(8.0) IDC(900) IPSIC(1,500)	Benzene (1.21) Ethylbenzene (1.0) Methylene chloride (0.0074) Xylenes (total) (1.7) Total PCBs (0.0017) Antimony (0.0068) Arsenic (0.061) Barium (1.5) Lead (0.0058) Selenium (0.052)	IDW(0.0050) IDW(0.70) IDW(0.0050) GSI(0.035) IDW(0.0060) IDW(0.0060) IDW(0.0050) GSI(0.82) IDW(0.0040) IDW(0.0050)	
Aeration	Lagoons Area			I	1	Coloniam (0.002)	1211(0.000)	
WL	Former Aeration Lagoons Area		•Installed 15 soil borings (57) •Installed 3 temporary wells (4) •Sampled 4 existing monitoring wells (6)	No exceedences		No exceedences		
Building	01 Area			•	•			
ACSP	Harriet Street Property Area		•Installed 19 soil borings (68) •Installed 3 temporary wells (4) •Installed 1 monitoring well (1) •Reinstalled 1 monitoring well (1)	No exceedences		Benzene (0.044)	IDW(0.0050)	
BD01	Building 01 (Administration Building) Area		•Installed 4 soil borings (11) •Installed 1 temporary well (1) •Installed 3 monitoring wells (3) •Reinstalled 1 monitoring well (3)	No exceedences		Benzene (0.087)	IDW(0.0050)	
Building	94 Employee Parking Lot Area				•			
EP	Building 94 Employee Parking Lot		•Installed 7 soil borings (18) •Installed 2 temporary wells (2) •Sampled 1 existing monitoring well (1)	No exceedences		No exceedences		
	und Samples				•			
	Surface soil samples collected to determine Site background concentrations of metals		•Installed 10 soil borings (10)	Manganese (2,100)	IPSIC(1,500)	No sample collected		

TABLE 5-1 SUMMARY OF RFI ACTIVITIES, RESULTS, AND INVESTIGATION STATUS

RFI PHASE II REPORT GENERAL MOTORS CORPORATION NAO FLINT OPERATIONS SITE - FLINT, MICHIGAN

Notes:

- 1. mg/kg = milligrams per kilogram.
- 2. mg/L = milligrams per liter.
- 3. Michigan Part 201 Screening Criteria (December 2002)
 - GCC = Groundwater Contact Criteria.
 - GSI = Groundwater/Surface Water Interface Criteria.
 - IDC = Industrial Direct Contact Criteria.
 - IDW = Industrial Drinking Water Criteria.
 - IPSIC = Industrial Particulate Soil Inhalation Criteria.
 - IISVSIC = In Infinite Source Volatile Soil Inhalation Criteria.
 - ISVIA = Industrial Soil Volatilization to Indoor Air Inhalation Criteria.