

OResults of Radioactive Material Monitoring of Aquatic Organisms (Locations A and B along the Abukuma River)

<Locations A and B along the Abukuma River: Samples collected>

Items Locations	General items		Radioactive materials			
	Water	Sediment	Water (Cs)	Water (Sr)	Sediment (Cs)	Sediment (Sr)
A-1	○	○	○	○	○	○
A-2	○	○	○	-	○	-
B-2	○	○	○	-	○	-
B-3	○	○	○	-	○	-

<Locations A and B along the Abukuma River: Site measurement item>

Items Locations	Latitude and longitude of the location		Survey date and time			Water	Sediment				Other	
	Latitude	Longitude	Date	Time (water)	Time (sediment)	Water temperature (degrees C)	Sediment temperature (degrees C)	Property	Color	Contaminants	Water depth (m)	Transparency (cm)
A-1(Surface layer)	37.6210°	140.5218°	2019/6/10	08:50	09:20	19.1	19.2	Sand with silt	2.5Y4/1	Plant pieces	6.70	47 (1.1m)*
A-1(Bottom layer)				09:06								
A-2	37.5673°	140.3946°		11:08	11:15	16.9	16.7	Sand	2.5Y3/2	None	0.82	>50
B-2	37.8121°	140.5058°		14:28	14:31	17.9	18.7	Sand	2.5Y4/2	None	0.60	>50
B-3	37.8182°	140.4679°		13:08	13:15	15.8	16.1	Sand	2.5Y4/3	None	0.70	>50

* The number in parentheses indicates Secchi disk depth.

<Locations A and B along the Abukuma River: General survey items/Analysis of radioactive materials Water>

Items Locations	Latitude and longitude of the location		Survey date and time		pH	BOD	COD	DO	Electric conductivity	Salinity	TOC	SS	Turbidity	Cs-134	Cs-137	Sr-90
	Latitude	Longitude	Date	Time (water)		(mg/L)	(mg/L)	(mg/L)	(mS/m)		(mg/L)	(mg/L)	(FNU)	(Bq/L)	(Bq/L)	(Bq/L)
A-1(Surface layer)	37.6210°	140.5218°	2019/6/10	08:50	7.3	1.4	5.6	8.7	18.3	0.09	2.7	12	5.3	0.0028	0.053	0.0012
A-1(Bottom layer)				09:06	7.4	1.5	5.1	8.9	18.4	0.09	2.7	14	6.5	0.0035	0.052	-
A-2	37.5673°	140.3946°		11:08	7.3	0.9	4.1	9.8	12.1	0.06	1.4	6	2.8	0.0016	0.020	-
B-2	37.8121°	140.5058°		14:28	7.4	1.2	5.4	9.3	16.9	0.09	2.4	11	5.5	0.0023	0.027	-
B-3	37.8182°	140.4679°		13:08	7.3	0.8	3.3	10.1	8.0	0.04	1.2	4	2.3	N.D.(0.0016)	0.0095	-

Note) N.D. means to be below the detection limit and figures in parentheses show the detection limit.

<Locations A and B along the Abukuma River: General survey items/Analysis of radioactive materials Sediment>

Items	Latitude and longitude of the location		Survey date and time		pH	Redox potential E _{NHLE} (mV)	Water content (%)	IL (%)	TOC (mg/g-dry)	Soil particle density (g/cm ³)	Grain size distribution								Cs-134 (Bq/kg-dry)	Cs-137 (Bq/kg-dry)	Sr-90 (Bq/kg-dry)
	Latitude	Longitude	Date	Time (sediment)							Gravel (2-75mm) (%)	Coarse sand (0.85-2mm) (%)	Medium sand (0.25-0.85mm) (%)	Fine sand (0.075-0.25mm) (%)	Silt (0.005-0.075mm) (%)	Clay (Less than 0.005mm) (%)	Median grain diameter (mm)	Maximum grain diameter (mm)			
Locations																					
A-1	37.6210°	140.5218°	2019/6/10	09:20	7.2	56	52.5	6.7	18.2	2.665	0.5	1.3	23.4	18.5	28.5	27.8	0.043	4.8	38	490	0.46
A-2	37.5673°	140.3946°		11:15	6.7	278	27.0	2.8	6.9	2.726	22.0	28.5	30.5	6.2	4.9	7.9	0.87	9.5	20	250	-
B-2	37.8121°	140.5058°		14:31	7.1	280	27.0	1.8	2.1	2.713	0.5	4.1	72.5	17.2	0.9	4.8	0.37	4.8	9.2	130	-
B-3	37.8182°	140.4679°		13:15	7.0	263	20.8	2.3	3.9	2.664	29.3	37.0	23.0	6.3	2.3	2.1	1.3	9.5	9.3	140	-

Note) N.D. means to be below the detection limit and figures in parentheses show the detection limit.

<Locations A and B along the Abukuma River: Analysis items Aquatic organisms>

Locations	Sampling point	Latitude and longitude of the location		Sampling date	Division	Class	Order	Family	Scientific name	English name	Population	Sample weight (kg-wet)	Note			Radioactive cesium (Bq/kg-wet)			Sr-90 (Bq/kg-wet)				
		Latitude	Longitude										Growth stage	Stomach contents	Measurement site	Total	Cs-134	Cs-137					
A-1	The main stream of the Abukuma River	37.6210°	140.5218°	2019/5/31	Arthropoda	Insecta	Ephemeroptera	Isonychiidae	<i>Isonychia valida</i>	Isonychia valida	124	0.014	Larva	-	-	41.5	3.5	38	-				
					Arthropoda	Insecta	Odonata	Corduliidae	<i>Macromia amphigena amphigena</i>	Macromia amphigena	33	0.016	Larva(Dragonfly larva)	-	-	4.8	N.D.(1.9)	4.8	-				
					Arthropoda	Insecta	Odonata	Cordulegastridae	<i>Anotogaster sieboldii</i>	Anotogester sieboldii													
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Melligomphus viridicostus</i>	Melligomphus viridicostus													
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Sieboldius albardae</i>	Sieboldius albardae													
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Asiagomphus melaenops</i>	Asiagomphus melaenops													
					Arthropoda	Insecta	Odonata	Aeshnidae	<i>Anax parthenope julius</i>	Anax parthenope julius													
					Arthropoda	Insecta	Odonata	Aeshnidae	<i>Boyeria maclachlani</i>	Boyeria maclachlani													
					Arthropoda	Malacostraca	Decapoda	Cambaridae	<i>Procambarus clarkii</i>	Red swamp crawfish	3	0.032	Juvenile,Imago	-	-	5.7	N.D.(1.6)	5.7	-				
					Arthropoda	Malacostraca	Decapoda	Atyidae	<i>Neocaridina sp.</i>	Neocaridina	408	0.072	Juvenile,Imago	-	-	25.8	1.8	24	-				
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Tribolodon hakonensis</i>	Japanese dace	3	0.018	Immature fish	-	-	11	N.D.(2.3)	11	-				
				2019/6/1	Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Opsariichthys platypus</i>	Pale chub	4	0.033	Immature fish,Mature fish	-	-	9.5	N.D.(1.5)	9.5	-				
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Carassius auratus</i>	Carassius auratus langsdorfii	4	1.5	Mature fish	-	-	3.78	0.38	3.4	0.32				
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Gnathopogon elongatus elongatus</i>	Gnathopogon elongatus elongatus	81	0.23	Immature fish,Mature fish	-	-	3.0	N.D.(0.33)	3.0	-				
					Vertebrata	Osteichthyes	Cypriniformes	Cobitidae	<i>Misgurnus anguillicaudatus</i>	Oriental weatherfish	4	0.033	Mature fish	-	-	2.2	N.D.(1.4)	2.2	-				
				2019/5/31	Vertebrata	Osteichthyes	Cypriniformes	Cobitidae	<i>Nemacheilus toni</i>	Stone loach	38	0.35	Immature fish	-	-	2.4	N.D.(0.25)	2.4	-				
					2019/6/1	Vertebrata	Osteichthyes	Perciformes	Centrarchidae	<i>Micropterus dolomieu</i>	Small mouth bass	3	1.8	Immature fish,Mature fish	Red swamp crawfish,Gnathopogon elongatus elongatus	Viscera removed	9.58	0.68	8.9	0.24			
						Vertebrata	Osteichthyes	Siluriformes	Ictaluridae	<i>Ictalurus punctatus</i>	Channel catfish	4	2.3	Immature fish	Red swamp crawfish,mammals,Terrestrial insect,Elmidae,Psephenidae	Viscera removed	18.0	1.0	17	0.23			
					2019/5/31	Vertebrata	Amphibia	Anura	-	-	Frog	57	0.027	Larva(Tadpole)	-	-	358	28	330	-			
				Vertebrata		Amphibia	Anura	Ranidae	<i>Rana japonica</i>	Japanese brown frog	16	0.059	Imago	-	-	29.5	2.5	27	-				
				Vertebrata		Amphibia	Anura	Hylidae	<i>Hyla japonica</i>	Japanese tree flog													
				Vertebrata		Amphibia	Anura	Glandirana	<i>Glandirana rugosa</i>	Wrinkled frog													
A-2	Harase River	37.5673°	140.3946°	2019/5/31	Algae/plant	-	-	-	-	Riverbed Deposits (Include algae)	-	0.0099	-	-	-	70.4	5.4	65	-				
					Arthropoda	Insecta	Trichoptera	Stenopsychidae	<i>Stenopsyche marmorata</i>	Stenopsyche marmorata	120	0.048	Larva	-	-	28.2	2.2	26	-				
					Arthropoda	Insecta	Odonata	Corduliidae	<i>Macromia amphigena amphigena</i>	Macromia amphigena	69	0.062	Larva(Dragonfly larva)	-	-	6.1	N.D.(1.2)	6.1	-				
					Arthropoda	Insecta	Odonata	Cordulegastridae	<i>Anotogaster sieboldii</i>	Anotogester sieboldii													
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Melligomphus viridicostus</i>	Melligomphus viridicostus													
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Sieboldius albardae</i>	Sieboldius albardae													
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Asiagomphus melaenops</i>	Asiagomphus melaenops													
					Arthropoda	Malacostraca	Decapoda	Cambaridae	<i>Procambarus clarkii</i>	Red swamp crawfish	8	0.075	Juvenile,Imago	-	-	17.5	1.5	16	-				
					Arthropoda	Malacostraca	Decapoda	Atyidae	<i>Neocaridina sp.</i>	Neocaridina	458	0.090	Juvenile,Imago	-	-	8.58	0.78	7.8	-				
					Mollusca	Gastropoda	Discopoda	Pleuroceridae	<i>Semisulcospira libertina</i>	Semisulcospira libertina	30	0.026	Imago	-	Molluscos part	5.8	N.D.(2.7)	5.8	-				
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Phoxinus lagowskii steindachneri</i>	Amur minnow	91	0.19	Immature fish,Mature fish	-	-	5.0	N.D.(0.38)	5.0	-				
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Opsariichthys platypus</i>	Pale chub	18	0.024	Immature fish	-	-	3.3	N.D.(2.3)	3.3	-				
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Candidia temminckii</i>	Dark chub	5	0.043	Immature fish,Mature fish	-	-	14	N.D.(1.6)	14	-				
					Vertebrata	Osteichthyes	Cypriniformes	Cobitidae	<i>Misgurnus anguillicaudatus</i>	Oriental weatherfish	30	0.11	Immature fish,Mature fish	-	-	7.3	N.D.(0.65)	7.3	-				
					Vertebrata	Osteichthyes	Cypriniformes	Cobitidae	<i>Nemacheilus toni</i>	Stone loach	23	0.12	Immature fish	-	-	3.7	N.D.(0.67)	3.7	-				
					Vertebrata	Osteichthyes	Salmoniformes	Salmonidae	<i>Oncorhynchus masou</i>	Yamame trout	5	0.066	Immature fish	-	-	6.8	N.D.(1.1)	6.8	-				
					Vertebrata	Cephalaspidomorphi	Petromyzontiformes	Petromyzontidae	<i>Lethenteron reissneri</i>	Far eastern brook lamprey	9	0.017	Ammocoetes(larva)	-	-	20	N.D.(2.9)	20	-				
					Vertebrata	Amphibia	Anura	-	-	Frog	140	0.070	Larva(Tadpole)	-	-	139.7	9.7	130	-				
					Vertebrata	Amphibia	Anura	Hylidae	<i>Hyla japonica</i>	Japanese tree flog	5	0.021	Imago	-	-	7.5	N.D.(2.1)	7.5	-				
					Vertebrata	Amphibia	Anura	Pelophylax	<i>Pelophylax porosus porosus</i>	Tokyo daruma pond frog													
					Vertebrata	Amphibia	Caudata	Salamandridae	<i>Cynops pyrrhogaster</i>	Cynops pyrrhogaster	3	0.030	Imago	-	-	6.4	N.D.(2.1)	6.4	-				
					Coarse Particulate Organic Matter					-	-	-	-	Bottom fallen leaves	-	0.21	-	-	-	24.1	2.1	22	-
B-2	The main stream of the Abukuma River	37.8121°	140.5058°	2019/5/30	Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Tribolodon hakonensis</i>	Japanese dace	12	3.0	Mature fish	-	-	6.4	1.0	5.4	0.18				
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Hemibarbus barbus</i>	Hemibarbus barbus	3	5.0	Mature fish	Obscure digesta	Viscera removed	8.77	0.57	8.2	0.26				
					Vertebrata	Osteichthyes	Perciformes	Centrarchidae	<i>Micropterus dolomieu</i>	Small mouth bass	2	3.5	Mature fish	Empty stomach	Viscera removed	21.9	1.9	20	0.17				
					Vertebrata	Osteichthyes	Siluriformes	Ictaluridae	<i>Ictalurus punctatus</i>	Channel catfish	1	3.5	Mature fish	Japanese mitten Crab	Viscera removed	14.2	1.2	13	0.18				
B-3	Surikami River	37.8182°	140.4679°	2019/6/1	Algae/plant	-	-	-	-	Riverbed Deposits (Include algae)	-	0.076	-	-	-	42.6	4.6	38	-				
					Algae/plant	Zygnematomyceae	Zygnematales	Zygnemataceae	<i>Spirogyra sp.</i>	Spirogyra	-	0.17	-	-	-	10.61	0.81	9.8	-				
					Algae/plant	Monocotyledoneae	Najadales	Potamogetonaceae	<i>Potamogeton crispus</i>	Curly-leaf pondweed	-	0.21	-	-	-	4.3	N.D.(0.37)	4.3	-				
					Arthropoda	Insecta	Ephemeroptera	Ephemeridae	<i>Ephemera strigata</i>	Mont mayfly	95	0.0096	Larva	-	-	11	N.D.(4.1)	11	-				
					Arthropoda	Insecta	Trichoptera	Stenopsychidae	<i>Stenopsyche marmorata</i>	Stenopsyche marmorata	237	0.083	Larva	-	-	16.89	0.89	16	-				
					Arthropoda	Insecta	Odonata	Corduliidae	<i>Macromia amphigena amphigena</i>	Macromia amphigena	52	0.039	Larva(Dragonfly larva)	-	-	5.2	N.D.(1.6)	5.2	-				
					Arthropoda	Insecta	Odonata	Cordulegastridae	<i>Anotogaster sieboldii</i>	Anotogester sieboldii													
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Melligomphus viridicostus</i>	Melligomphus viridicostus													
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Sieboldius albardae</i>	Sieboldius albardae													
					Arthropoda	Insecta	Megaloptera	Corydalidae	<i>Protohermes grandis</i>	Protohermes grandis	53	0.047	Larva	-	-	1.6	N.D.(1.3)	1.6	-				
					Arthropoda	Malacostraca	Decapoda	Cambaridae	<i>Procambarus clarkii</i>	Red swamp crawfish	7	0.084	Juvenile,Imago	-	-	11	N.D.(0.80)	11	-				
					Mollusca	Gastropoda	Discopoda	Pleuroceridae	<i>Semisulcospira libertina</i>	Semisulcospira libertina	30	0.035	Imago	-	Molluscos part	10	N.D.(1.6)	10	-				
					Vertebrata	Osteichthyes	Scorpaeniformes	Cottidae	<i>Cottus pollux</i>	Japanese fluvial sculpin	51	0.48	Immature fish	-	-	4.3	N.D.(0.44)	4.3	-				
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Phoxinus lagowskii steindachneri</i>	Amur minnow	64	0.31	Immature fish,Mature fish	-	-	3.4	N.D.(0.38)	3.4	-				
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Tribolodon hakonensis</i>	Japanese dace	9	0.079	Immature fish	-	-	5.3	N.D.(0.90)	5.3	-				
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Candidia temminckii</i>	Dark chub	7	0.0097	Immature fish	-	-	3.4	N.D.(3.5)	3.4	-				
					Vertebrata	Osteichthyes	Cypriniformes	Cobitidae	<i>Misgurnus anguillicaudatus</i>	Oriental weatherfish	42	0.16	Immature fish,Mature fish	-	-	5.5	N.D.(0.44)	5.5	-				
					Vertebrata	Osteichthyes	Cypriniformes	Cobitidae	<i>Nemacheilus toni</i>	Stone loach	24	0.20	Immature fish	-	-	4.28	0.38	3.9	-				
					Vertebrata	Osteichthyes	Salmoniformes	Salmonidae	<i>Oncorhynchus masou</i>	Yamame trout	7	0.060	Immature fish	-	-	4.7	N.D.(1.2)	4.7	-				
					Vertebrata	Amphibia	Anura	-	-	Frog	14	0.018	Larva(Tadpole)	-	-	71.7	5.7	66	-				
					Vertebrata	Amphibia	Anura	Glandirana	<i>Glandirana rugosa</i>	Wrinkled frog	5	0.057	Imago	-	-	4.2	N.D.(1.1)	4.2	-				
					Coarse Particulate Organic Matter					-	-	-	-	Bottom fallen leaves	-	0.28	-	-	-	17.2	1.2	16	-

*6: River bottom materials (incl. algae) are algae, etc. that were scratched off stones with a brush, etc. and may include very fine particles such as inorganic silt and clay.

*7: N.D. means to be below the detection limit and figures in parentheses show the detection limit.

*8: Activity concentrations include counting errors, but the details are omitted here.