

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°	2019/9/19	08:44	09:06	20.8	21.7	Silt with sand	2.5Y3/1	Plant pieces	6.50	50 (1.0m)*
A-1(Bottom layer)				08:35		20.9						
A-2	37.5673°	140.3946°		10:50	11:02	18.8	18.8	Sand	2.5Y3/3	None	0.88	>50
B-2	37.8121°	140.5058°		14:14	14:22	21.8	20.7	Fine sand	2.5Y3/3	None	0.70	>50
B-3	37.8182°	140.4679°		13:10	13:18	19.7	19.1	Sand	2.5Y3/2	None	0.49	>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 (mg/L)	COD (mg/L)	DO (mg/L)	Electric conductivity (mS/m)	Salinity	TOC (mg/L)	SS (mg/L)	Turbidity (FNU)	Cs-134 (Bq/L)	Cs-137 (Bq/L)	Sr-90 (Bq/L)
	Latitude	Longitude	Date	Time (water)												
A-1(Surface layer)	37.6210°	140.5218°	2019/9/19	08:44	7.3	1.5	4.2	8.6	17.9	0.09	1.6	9	4.7	N.D.(0.0013)	0.012	0.0011
A-1(Bottom layer)				08:35	7.4	1.4	4.1	8.8	18.3	0.09	1.7	9	4.8	N.D.(0.0014)	0.015	-
A-2	37.5673°	140.3946°		10:50	7.4	0.7	3.3	9.5	10.6	0.06	1.2	5	3.7	N.D.(0.0015)	0.013	-
B-2	37.8121°	140.5058°		14:14	7.4	0.9	3.3	9.2	16.7	0.08	1.5	8	5.1	N.D.(0.0012)	0.0088	-
B-3	37.8182°	140.4679°		13:10	7.5	0.6	3.3	9.7	9.3	0.05	1.3	3	1.4	0.0013	0.0072	-

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 _{NHE} (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)
Locations	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)			
A-1	37.6210°	140.5218°	2019/9/19	09:06	7.3	171	55.9	10.1	32.9	2.598	0.0	0.0	2.7	36.8	29.9	30.6	0.044	2.0	57	870	0.51
A-2	37.5673°	140.3946°		11:02	7.3	279	24.2	2.1	2.9	2.669	11.6	46.1	32.0	5.9	0.7	3.7	0.98	4.8	13	160	-
B-2	37.8121°	140.5058°		14:22	7.5	258	25.6	1.8	2.5	2.726	0.2	0.9	57.5	38.3	0.8	2.3	0.28	4.8	11	160	-
B-3	37.8182°	140.4679°		13:18	7.5	269	23.7	1.6	1.6	2.700	8.6	24.0	57.6	7.3	2.5		0.62	4.8	5.5	88	-

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°	2019/8/19	Arthropoda	Malacostraca	Decapoda	Cambaridae	<i>Procambarus clarkii</i>	Red swamp crawfish	2	0.026	Imago	-	-	3.1	N.D.(1.5)	3.1	-
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Tribolodon hakonensis</i>	Japanese dace	9	0.32	Immature fish,Mature fish	-	-	6.43	0.43	6.0	-
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Opsariichthys platypus</i>	Pale chub	93	0.51	Immature fish	-	-	14.1	1.1	13	-
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Cyprinus carpio</i>	Common carp	1	0.87	Mature fish	Obscure digesta	Viscera removed	4.47	0.27	4.2	-
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Gnathopogon elongatus elongatus</i>	Gnathopogon elongatus elongatus	4	0.021	Immature fish,Mature fish	-	-	2.9	N.D.(2.6)	2.9	-
					Vertebrata	Osteichthyes	Cypriniformes	Cobitidae	<i>Misgurnus anguillicaudatus</i>	Oriental weatherfish	1	0.012	Mature fish	-	-	N.D.	N.D.(3.3)	N.D.(2.7)	-
					Vertebrata	Osteichthyes	Cypriniformes	Cobitidae	<i>Nemacheilus toni</i>	Stone loach	7	0.047	Immature fish	-	-	1.9	N.D.(1.5)	1.9	-
					Vertebrata	Osteichthyes	Perciformes	Centrarchidae	<i>Micropterus salmoides</i>	Largemouth bass	2	0.016	Immature fish	-	-	5.2	N.D.(2.5)	5.2	-
					Vertebrata	Osteichthyes	Perciformes	Centrarchidae	<i>Micropterus dolomieu</i>	Small mouth bass	3	0.23	Immature fish	-	-	6.22	0.42	5.8	-
					Vertebrata	Osteichthyes	Perciformes	Centrarchidae	<i>Micropterus dolomieu</i>	Small mouth bass	1	0.63	Mature fish	Empty stomach	Viscera removed	10.43	0.63	9.8	-
					Vertebrata	Osteichthyes	Perciformes	Centrarchidae	<i>Lepomis macrochirus</i>	Bluegill	2	0.067	Immature fish	-	-	4.5	N.D.(0.97)	4.5	-
					Vertebrata	Osteichthyes	Perciformes	Actinopterygii	<i>Channa argus</i>	Snakehead	1	1.6	Mature fish	Empty stomach	Viscera removed	95.4	5.4	90	0.31
					Vertebrata	Osteichthyes	Siluriformes	Ictaluridae	<i>Ictalurus punctatus</i>	Channel catfish	2	2.1	Immature fish,Mature fish	Empty stomach	Viscera removed	21.2	2.2	19	0.31
A-2	Harase River	37.5673°	140.3946°	2019/8/20	Algae/plant	-	-	-	-	Riverbed Deposits (Include algae)	-	0.017	-	-	-	243	13	230	-
					Arthropoda	Insecta	Trichoptera	Stenopsychidae	<i>Stenopsyche marmorata</i>	Stenopsyche marmorata	65	0.025	Larva	-	-	15.8	1.8	14	-
					Arthropoda	Insecta	Odonata	Corduliidae	<i>Macromia amphigena amphigena</i>	Macromia amphigena	25	0.010	Larva(Dragonfly larva)	-	-	7.9	N.D.(4.1)	7.9	-
					Arthropoda	Insecta	Odonata	Cordulegastriidae	<i>Anotogaster sieboldii</i>	Anotogaster sieboldii									
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Meligomphus viridicostus</i>	Meligomphus viridicostus									
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Sieboldius albardae</i>	Sieboldius albardae									
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Davidius sp.</i>	Davidius									
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Asiagomphus melaenops</i>	Asiagomphus melaenops									
					Arthropoda	Malacostraca	Decapoda	Potamidae	<i>Geothelphusa dehaani</i>	Japanese freshwater crab	10	0.014	Juvenile	-	-	5.1	N.D.(3.0)	5.1	-
					Arthropoda	Malacostraca	Decapoda	Atyidae	<i>Neocaridina sp.</i>	Neocaridina	207	0.038	Juvenile,Imago	-	-	9.4	N.D.(1.5)	9.4	-
					Mollusca	Gastropoda	Discopoda	Pleuroceridae	<i>Semisulcospira libertina</i>	Semisulcospira libertina	30	0.016	Imago	-	Molluscous part	18.4	2.4	16	-
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Phoxinus lagowskii steindachneri</i>	Amur minnow	8	0.054	Immature fish,Mature fish	-	-	11	N.D.(1.2)	11	-
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Tribolodon hakonensis</i>	Japanese dace	3	0.060	Immature fish,Mature fish	-	-	17.3	1.3	16	-
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Opsariichthys platypus</i>	Pale chub	32	0.14	Immature fish	-	-	10.8	1.1	9.7	-
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Candidia temminckii</i>	Dark chub	6	0.047	Immature fish,Mature fish	-	-	6.5	N.D.(1.2)	6.5	-
					Vertebrata	Osteichthyes	Cypriniformes	Cobitidae	<i>Misgurnus anguillicaudatus</i>	Oriental weatherfish	56	0.086	Immature fish,Mature fish	-	-	9.81	0.81	9.0	-
					Vertebrata	Osteichthyes	Cypriniformes	Cobitidae	<i>Nemacheilus toni</i>	Stone loach	30	0.21	Immature fish	-	-	4.33	0.33	4.0	-
					Vertebrata	Amphibia	Anura	Ranidae	<i>Rana japonica</i>	Japanese brown frog	7	0.026	Imago	-	-	33.1	2.1	31	-
					Vertebrata	Amphibia	Anura	Pelophylax	<i>Pelophylax porosus porosus</i>	Tokyo daruma pond frog									
					Coarse Particulate Organic Matter	-	-	-	-	Bottom fallen leaves	-	0.18	-	-	-	39.1	2.1	37	-
B-2	The main stream of the Abukuma River	37.8121°	140.5058°	2019/8/30	Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Tribolodon hakonensis</i>	Japanese dace	10	2.8	Mature fish	Obscure digesta	Viscera removed	8.72	0.42	8.3	0.18
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Carassius auratus</i>	Carassius auratus langsdorffii	2	0.11	Immature fish,Mature fish	Obscure digesta	Viscera removed	8.94	0.94	8.0	-
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Hemibarbus barbus</i>	Hemibarbus barbus	2	3.2	Mature fish	Obscure digesta	Viscera removed	5.97	0.37	5.6	0.30
					Vertebrata	Osteichthyes	Perciformes	Centrarchidae	<i>Micropterus dolomieu</i>	Small mouth bass	18	4.0	Immature fish,Mature fish	Red swamp crawfish,Pseudogobio esocinus	Viscera removed	21.5	1.5	20	0.40
					Vertebrata	Osteichthyes	Perciformes	Centrarchidae	<i>Lepomis macrochirus</i>	Bluegill	1	0.081	Mature fish	Empty stomach	Viscera removed	5.2	N.D.(2.1)	5.2	-
					Vertebrata	Osteichthyes	Siluriformes	Ictaluridae	<i>Ictalurus punctatus</i>	Channel catfish	4	3.0	Immature fish	Red swamp crawfish,Waterweed	Viscera removed	8.94	0.54	8.4	0.20
B-3	Surikami River	37.8182°	140.4679°	2019/8/27	Algae/plant	-	-	-	-	Riverbed Deposits (Include algae)	-	0.0084	-	-	-	100.7	8.7	92	-
					Arthropoda	Insecta	Trichoptera	Stenopsychidae	<i>Stenopsyche marmorata</i>	Stenopsyche marmorata	303	0.089	Larva	-	-	35.8	2.8	33	-
					Arthropoda	Insecta	Odonata	Corduliidae	<i>Macromia amphigena amphigena</i>	Macromia amphigena	76	0.032	Larva(Dragonfly larva)	-	-	2.4	N.D.(1.7)	2.4	-
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Stylogomphus suzukii</i>	Stylogomphus suzukii									
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Meligomphus viridicostus</i>	Meligomphus viridicostus									
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Sieboldius albardae</i>	Sieboldius albardae									
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Davidius sp.</i>	Davidius									
					Arthropoda	Insecta	Megaloptera	Corydalidae	<i>Protohermes grandis</i>	Protohermes grandis	69	0.050	Larva	-	-	2.7	N.D.(1.2)	2.7	-
					Arthropoda	Malacostraca	Decapoda	Cambaridae	<i>Procambarus clarkii</i>	Red swamp crawfish	6	0.13	Imago	-	-	8.39	0.59	7.8	-
					Vertebrata	Osteichthyes	Anguilliformes	Anguillidae	<i>Anguilla japonica</i>	Japanese eel	3	1.4	Immature fish,Mature fish	Empty stomach	Viscera removed	7.27	0.67	6.6	0.12
					Vertebrata	Osteichthyes	Scorpaeniformes	Cottidae	<i>Cottus pollux</i>	Japanese fluvial sculpin	40	0.49	Immature fish	-	-	2.4	N.D.(0.41)	2.4	-
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Phoxinus lagowskii steindachneri</i>	Amur minnow	48	0.24	Immature fish,Mature fish	-	-	5.96	0.56	5.4	-
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Candidia temminckii</i>	Dark chub	17	0.085	Immature fish,Mature fish	-	-	3.2	N.D.(1.1)	3.2	-
					Vertebrata	Osteichthyes	Cypriniformes	Cobitidae	<i>Nemacheilus toni</i>	Stone loach	43	0.43	Immature fish	-	-	1.8	N.D.(0.43)	1.8	-
					Vertebrata	Osteichthyes	Salmoniformes	Osmeridae	<i>Plecoglossus altivelis altivelis</i>	Sweetfish	1	0.036	Mature fish	-	-	14	N.D.(1.8)	14	-
					Vertebrata	Osteichthyes	Salmoniformes	Salmonidae	<i>Oncorhynchus masou</i>	Yamame trout	1	0.0086	Immature fish	-	-	N.D.	N.D.(4.7)	N.D.(4.4)	-
					Vertebrata	Osteichthyes	Perciformes	Centrarchidae	<i>Lepomis macrochirus</i>	Bluegill	2	0.069	Immature fish	-	-	3.6	N.D.(1.1)	3.6	-
					Vertebrata	Osteichthyes	Siluriformes	Bagridae	<i>Tachysurus tokiensis</i>	Cut-tailed bullhead	2	0.081	Immature fish,Mature fish	-	-	12.0	1.0	11	-
					Vertebrata	Amphibia	Anura	Glandirana	<i>Glandirana rugosa</i>	Wrinkled frog	1	0.0098	Imago	-	-	3.8	N.D.(3.3)	3.8	-
					Coarse Particulate Organic Matter	-	-	-	-	Bottom fallen leaves	-	0.24	-	-	-	24.7	1.7	23	-

*1: Organisms were collected in or around the targeted water areas.

*2: When multiple types of aquatic organisms were collected, a sample was prepared by mixing them.

*3: For a sample made of multiple types of aquatic organisms, the English name of the dominant one largest in number is underlined.

*4: Basically, measurement was conducted for all organism samples. Viscera (stomach and bowels) were removed for the measurement when possible so that undigested food and sediments, etc. in the digestive system would be excluded.

*5: Plankton (suspended algae) is the residue remaining after the filtration of lake water or seawater with a plankton net (40µm-mesh).

*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.