

Results 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°	2018/6/8	09:15	09:40	23.5	22.2	Silt	2.5Y3/1	Plant pieces	7.60	>50 (1.9m)*
A-1(Bottom layer)				09:00		23.3						
A-2	37.5673°	140.3946°		11:35	11:45	23.0	22.4	Sand	2.5Y4/3	None	0.82	>50
B-2	37.8121°	140.5058°		15:15	15:25	20.5	21.0	Sand	2.5Y4/4	Plant pieces	0.38	>50
B-3	37.8182°	140.4679°		14:00	14:15	19.5	19.7	Sand	2.5Y3/3	None	0.81	>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°	2018/6/8	09:15	7.3	1.6	4.5	8.0	19.9	0.11	2.3	5	3.1	0.0017	0.015	0.0013
A-1(Bottom layer)				09:00	7.3	1.7	4.7	8.3	19.9	0.11	2.4	8	3.6	N.D.(0.0016)	0.020	-
A-2	37.5673°	140.3946°		11:35	7.3	0.8	3.6	9.8	13.1	0.07	1.5	4	2.5	0.0032	0.026	-
B-2	37.8121°	140.5058°		15:15	7.4	1.0	3.4	9.5	9.9	0.06	1.3	8	3.3	0.0027	0.021	-
B-3	37.8182°	140.4679°		14:00	7.4	0.9	3.0	10.2	5.6	0.03	1.1	8	2.9	N.D.(0.0015)	0.0096	-

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 Locations	Latitude and longitude of the location		Survey date and time		pH	Redox potential E _h (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)
A-1	37.6210°	140.5218°	2018/6/8	09:40	7.0	43	30.8	3.9	5.5	2.673	0.0	1.6	62.6	12.8	10.4	12.6	0.35	4.8	30	290	0.17
A-2	37.5673°	140.3946°		11:45	6.9	317	18.8	2.2	2.1	2.715	25.8	46.4	19.6	5.5	2.7		1.3	9.5	15	140	-
B-2	37.8121°	140.5058°		15:25	7.1	332	24.4	2.0	1.6	2.772	0.1	0.8	62.3	34.3	2.5		0.29	4.8	12	130	-
B-3	37.8182°	140.4679°		14:15	7.3	312	18.2	1.9	2.2	2.673	18.7	26.7	34.8	15.7	1.4	2.7	0.73	4.8	9.0	91	-

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-2	Harase River	37.5673°	140.3946°	2018/5/30	Algae/plant	-	-	-	-	Riverbed Deposits (Include algae)	-	0.0072	-	-	-	79.5	5.5	74	-			
					Arthropoda	Insecta	Trichoptera	Stenopsychidae	<i>Stenopsyche marmorata</i>	Stenopsyche marmorata	60	0.021	Larva	-	-	-	33.2	3.2	30	-		
					Arthropoda	Insecta	Odonata	Cordulidae	<i>Macromia amphigena amphigena</i>	Macromia amphigena	94	0.11	Larva(Dragonfly larva)	-	-	-	18.1	2.1	16	-		
					Arthropoda	Insecta	Odonata	Cordulegastriidae	<i>Anotogaster sieboldii</i>	Anotogaster sieboldii				-	-	-	-	-	-	-	-	-
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Sieboldius albardae</i>	Sieboldius albardae				-	-	-	-	-	-	-	-	-
					Arthropoda	Insecta	Odonata	Gomphidae	<i>Asiagomphus melanocephalus</i>	Asiagomphus melanocephalus				-	-	-	-	-	-	-	-	
					Arthropoda	Malacostraca	Decapoda	Cambaridae	<i>Procambarus clarkii</i>	Red swamp crawfish	6	0.029	Juvenile, Imago	-	-	-	14.8	1.8	13	-		
					Arthropoda	Malacostraca	Decapoda	Atyidae	<i>Neocaridina sp.</i>	Neocaridina	357	0.11	Juvenile, Imago	-	-	-	14.4	1.4	13	-		
					Mollusca	Gastropoda	Discopoda	Pleuroceridae	<i>Semisulcospira libertina</i>	Semisulcospira libertina	30	0.031	Imago	-	Molluscos part	-	15.4	1.4	140	-		
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Phoxinus lagowskii steindachneri</i>	Amur Minnow	226	1.1	Immature fish, Mature fish	-	-	-	7.45	0.95	6.5	0.23		
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Tribolodon hakonensis</i>	Japanese dace	14	0.16	Immature fish	-	-	-	9.64	0.94	8.7	-		
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Opsarichthys platypterus</i>	Pale chub	6	0.058	Immature fish	-	-	-	7.2	N.D.(0.85)	7.2	-		
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Pseudogobio esocinus esocinus</i>	Pseudogobio esocinus esocinus	4	0.054	Immature fish, Mature fish	-	-	-	6.2	N.D.(1.1)	6.2	-		
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Candidia temminckii</i>	Dark chub	18	0.067	Immature fish	-	-	-	7.3	1.2	6.1	-		
					Vertebrata	Osteichthyes	Cypriniformes	Cobitidae	<i>Misgurnus anguillicaudatus</i>	Oriental weatherfish	99	0.38	Immature fish, Mature fish	-	-	-	9.8	1.1	8.7	-		
					Vertebrata	Osteichthyes	Cypriniformes	Cobitidae	<i>Nemacheilus toni</i>	Stone loach	71	0.91	Immature fish	-	-	-	6.96	0.76	6.2	0.16		
					Vertebrata	Osteichthyes	Salmoniformes	Salmonidae	<i>Oncorhynchus masou</i>	Yamame trout	1	0.092	Mature fish	Diptera, Ant, Aquatic insect	Viscera removed	10	N.D.(0.83)	10	-			
					Vertebrata	Amphibia	Anura	-	-	Frog	28	0.014	Larva(Tadpole)	-	-	-	13.4	1.4	120	-		
					Vertebrata	Amphibia	Anura	Ranidae	<i>Rana japonica</i>	Japanese Brown Frog	7	0.040	Imago	-	-	-	19.7	1.7	18	-		
					Vertebrata	Amphibia	Anura	Glandirana	<i>Glandirana rugosa</i>	Wrinkled Frog	7	0.040	Imago	-	-	-	6.78	0.68	6.1	-		
					Vertebrata	Amphibia	Caudata	Salamandridae	<i>Cynops pyrrhogaster</i>	Cynops pyrrhogaster	11	0.068	Imago	-	-	-	6.78	0.68	6.1	-		
					Coarse Particulate Organic Matter	-	-	-	-	Bottom fallen leaves	-	0.18	-	-	-	-	32.3	3.3	29	-		
					B-2	The main stream of the Abukuma River	37.8121°	140.5058°	2018/5/17	Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Tribolodon hakonensis</i>	Japanese dace	27	7.8	Mature fish	Obscure digesta	Viscera removed	13.2	1.2
Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Hemibarbus barbus</i>						Hemibarbus barbus	3	4.7	Mature fish	Obscure digesta	Viscera removed	28.7	2.7	26	0.28			
Vertebrata	Osteichthyes	Perciformes	Centrarchidae	<i>Micropterus dolomieu</i>						Small mouth bass	3	5.2	Mature fish	Gomphidae, Crab	Viscera removed	28.0	3.0	25	0.22			
Vertebrata	Osteichthyes	Siluriformes	Ictaluridae	<i>Ictalurus punctatus</i>						Channel catfish	1	4.2	Mature fish	Small mammals, Crab	Viscera removed	10.6	1.1	9.5	0.34			
Vertebrata	Osteichthyes	Siluriformes	Siluridae	<i>Silurus asotus</i>						Amur catfish	1	1.7	Mature fish	Empty stomach	Viscera removed	40.9	3.9	37	0.27			
Algae/plant	-	-	-	-						Riverbed Deposits (Include algae)	-	0.012	-	-	-	40.1	4.1	36	-			
B-3	Surikami River	37.8182°	140.4679°	2018/5/28	Arthropoda	Insecta	Ephemeroptera	Siphonuridae	<i>Siphonuridae</i>	Siphonuridae	402	0.022	Larva	-	-	29.1	2.1	27	-			
					Arthropoda	Insecta	Ephemeroptera	Ephemeridae	<i>Ephemeria strigata</i>	Mont mayfly				-	-	-	-	-	-	-		
					Arthropoda	Insecta	Trichoptera	Stenopsychidae	<i>Stenopsyche marmorata</i>	Stenopsyche marmorata	405	0.14	Larva	-	-	-	24.4	2.4	22	-		
					Arthropoda	Insecta	Odonata	Cordulidae	<i>Macromia amphigena amphigena</i>	Macromia amphigena	46	0.032	Larva(Dragonfly larva)	-	-	-	7.7	N.D.(1.4)	7.7	-		
					Arthropoda	Insecta	Odonata	Cordulegastriidae	<i>Anotogaster sieboldii</i>	Anotogaster 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>Davidius sp.</i>	Davidius	44	0.051	Larva	-	-	-	1.6	N.D.(1.2)	1.6	-		
					Arthropoda	Malacostraca	Decapoda	Cambaridae	<i>Procambarus clarkii</i>	Red swamp crawfish				14	0.15	Juvenile, Imago	-	-	-	11.2	1.2	10
					Vertebrata	Osteichthyes	Anguilliformes	Anguillidae	<i>Anguilla japonica</i>	Japanese eel	4	1.3	Immature fish, Mature fish	Amur minnow, Cobitis bwaie	Viscera removed	13.2	1.2	12	0.12			
					Vertebrata	Osteichthyes	Scorpaeniformes	Cottidae	<i>Cottus pollux</i>	Japanese fluvial sculpin	43	0.29	Immature fish	-	-	-	4.26	0.56	3.7	-		
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Phoxinus lagowskii steindachneri</i>	Amur Minnow	194	2.4	Immature fish, Mature fish	-	-	-	4.38	0.48	3.9	0.36		
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Tribolodon hakonensis</i>	Japanese dace	31	0.24	Immature fish	-	-	-	5.12	0.52	4.6	-		
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Pseudogobio esocinus esocinus</i>	Pseudogobio esocinus esocinus	2	0.051	Mature fish	-	-	-	4.1	N.D.(0.95)	4.1	-		
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Candidia temminckii</i>	Dark chub	15	0.17	Immature fish, Mature fish	-	-	-	5.27	0.57	4.7	-		
					Vertebrata	Osteichthyes	Cypriniformes	Cyprinidae	<i>Cyprinus carpio</i>	Common carp	1	1.6	Mature fish	Obscure digesta	Viscera removed	8.84	0.94	7.9	0.37			
					Vertebrata	Osteichthyes	Cypriniformes	Cobitidae	<i>Misgurnus anguillicaudatus</i>	Oriental weatherfish	49	0.20	Immature fish, Mature fish	-	-	-	9.6	1.0	8.6	-		
					Vertebrata	Osteichthyes	Cypriniformes	Cobitidae	<i>Nemacheilus toni</i>	Stone loach	133	1.2	Immature fish	-	-	-	4.49	0.39	4.1	0.27		
					Vertebrata	Osteichthyes	Siluriformes	Bagridae	<i>Tachysurus tokiensis</i>	Cut-tailed ballhead	6	0.072	Immature fish, Mature fish	-	-	-	3.5	N.D.(0.90)	3.5	-		
					Vertebrata	Amphibia	Anura	-	-	Frog	8	0.011	Larva(Tadpole)	-	-	-	82.8	8.8	74	-		
					Vertebrata	Amphibia	Anura	Lithobates	<i>Lithobates catesbeianus</i>	American Bullfrog	1	0.55	Imago	-	-	-	7.24	0.74	6.5	-		
					Vertebrata	Amphibia	Anura	Glandirana	<i>Glandirana rugosa</i>	Wrinkled Frog	8	0.030	Imago	-	-	-	20.9	1.9	19	-		
					Vertebrata	Amphibia	Anura	Pelophylax	<i>Pelophylax porosus porosus</i>	Tokyo Daruma pond frog	8	0.030	Imago	-	-	-	20.9	1.9	19	-		
Coarse Particulate Organic Matter	-	-	-	-	Bottom fallen leaves	-	0.21	-	-	-	-	13.1	1.1	12	-							

*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.