Indigenous and Northern Affairs Canada
Affaires autochtones et du Nord Canada

Annex A-9

Report: Site-Specific Target Level for Arsenic in Surface Waters Associated with the Terra Mine Wetland

Canada

Final Report:

SITE-SPECIFIC TARGET LEVEL FOR ARSENIC IN SURFACE WATERS ASSOCIATED WITH THE TERRA MINE WETLAND

Prepared For:

Public Works and Government Services Canada

on behalf of:

Aboriginal Affairs & Northern Development Canada

Prepared By:

SENES Consultants

March 2014

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March 2014

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1.0 INTRODUCTION

SENES Consultants (SENES) completed a human health and ecological risk assessment (HHERA) for exposure to contamination at the Terra Mine (SENES 2014), as commissioned by Public Works and Government Services Canada (PWGSC) on behalf of Aboriginal Affairs and Northern Development Canada (AANDC), in order to facilitate future decision making regarding the management of the site. The HHERA was originally completed in 2007 (SENES 2007) and was later updated in 2014 (SENES 2014) to incorporate new environmental site data that became available since the original assessment was completed. Risks in the HHERA were calculated for people that might hypothetically camp at the site over a short period of time (i.e., 8 days) and for a range of ecological receptors that would be present both in the terrestrial and aquatic environments at the site.

The HHERA concluded that there are minimal risks to humans and ecological populations from exposure to most constituents of potential concern (COPC) at the Terra Mine site. However, it was found that arsenic exposures result in potentially unacceptable risks to human health through the consumption of fish from Ho-Hum Lake and the consumption of moose roaming the site. Furthermore, the wetland area was found to contain elevated concentrations of some metals, and in particular arsenic, that may have potential adverse effects on individual muskrat inhabiting the wetland area. Little Ho-Hum Lake and Ho-Hum Lake were also identified as areas where potential adverse effects are occurring from exposure to metals in fish and/or benthic invertebrates.

In order to guide future remedial activities at the Terra Mine site, PWGSC and AANDC required that a site-specific target level (SSTL) be developed for arsenic, the main constituent of concern at the Terra Mine, for surface waters associated with the wetland where the highest arsenic concentrations are observed. The Wetland Working Group, which consists of AANDC, PWGSC and the Expert Advisors, agreed that developing an SSTL for arsenic in sediments was not justified at present as not enough information has been collected to fully understand the arsenic loadings in the wetland and implications of sediment remediation. In addition, the focus of the SSTL was the protection of aquatic life as the site is remote and the risk to human health is just hypothetical.

This report details the methodology, assumptions, and results for the development of an SSTL for arsenic in surface water for use in the remedial actions at the Terra Mine site. The SSTL for arsenic is applicable to the discharge from the wetland and not the wetland itself as the wetland is serving as a sink for arsenic removal.

1.1 SITE-SPECIFIC TARGET LEVEL

Site-specific target levels (SSTLs) represent risk-based acceptable levels of COPC (e.g., arsenic) in water (or other media) that are not expected to result in adverse effects to humans and ecological receptors, based on the assumed receptor characteristics and exposures from the site.

The aquatic SSTL for arsenic was developed using a species sensitive distribution (SSD) approach, which is the current approach used by the Canadian Council of Ministers of the Environment (CCME) for developing Water Quality Guidelines for the Protection of Aquatic Life. The SSTL was based on a given protection level along the SSD curve and is applied to the outlet of the Terra Mine wetland.

The assumptions made for the risk-based SSTL were intended to err on the side of caution and therefore they over-estimate intakes.

1.2 APPLICATION OF SSTLS

While remediation is intended to mitigate environmental risks, it also has the potential to result in negative impacts. For example, remediating elevated metals concentrations in areas that are vegetated would typically result in the destruction of the vegetation and associated habitat. Within the northern context, such impacts would be long lived (e.g., lasting multiple decades). During the remedial decision-making process it is therefore necessary to consider whether the net benefit of potential remedial options can be justified. By extension, the application of the SSTLs needs to be justified and optimized to ensure that the ensuing remedial actions do more good than harm. As discussed above, the SSTL for arsenic in water should be applied at the outlet of the wetland.

1.3 REPORT STRUCTURE

The report has been structured into several chapters, as follows:

Chapter 2 – Site Description: This chapter provides a description of the relevant features at the Terra Mine site.

Chapter 3 – Methodology: This chapter provides a description of the methodology for developing an aquatic SSTL for arsenic.

Chapter 4 – Conclusions: This chapter provides a summary of the aquatic SSTL developed for the Terra Mine site.

Chapter 5 – References: This chapter provides references for literature used in the assessment.

2.0 SITE DESCRIPTION

The Terra Mine site is one of four abandoned underground silver mines that comprise the Silver Bear Mines, which are located approximately 400 km northwest of Yellowknife in the Northwest Territories, near the southeast point of Great Bear Lake. More specifically, the Terra Mine site is located on a peninsula, situated between the south shore of Rainy Lake (Camsell River) and the north shore of Ho-Hum Lake (see Figure 2-1). Drainage at the site occurs in a westerly direction towards the Camsell River and ultimately to Great Bear Lake; Little Ho-Hum Lake drains into Ho-Hum Lake, which in turn discharges naturally to Moose Bay through a wetland occurring between the two waterbodies. The mill site at the Terra Mine is located along the north shore of Ho-Hum Lake, which served as the tailings lake throughout the operation of the mill and contains submerged tailings and land-based tailings along its north shore. Coarse waste rock, which was used for the construction of the airstrip and embankments and in the laydown area around the mill, is distributed throughout the Terra Mine site.

In support of the Silver Bear Mines Remediation Plan (Rescan 2005) and the initial HHERA that was completed in 2007 (SENES 2007), soil, sediment (including sequential extraction data), aquatic vegetation (macrophyte), fish, and terrestrial vegetation (browse and forage) data were collected in 2004 and 2006 during site investigations. These data and supplemental environmental data that were collected from the site since 2007 were used in the 2014 update to the HHERA (SENES 2014). Supplemental data used in the HHERA included water quality data collected from 2007 to 2010; sediment data collected from the wetland in June and August 2009; and, sediment, fish and terrestrial vegetation (browse, forage and berries) data collected in June and August 2009 during baseline monitoring.

Surface water quality data have been routinely collected at the Terra Mine site since 2002 from the following key sampling stations: station T-2 at the outlet of Little Ho-Hum Lake; stations T-7, T-16 and T-8 in Ho-Hum Lake; station T-9 at the outlet of Ho-Hum Lake in the wetland; stations T-6/6B, T-10, and T-12 in Moose Bay (Camsell River); and, station T-4 at the Terra dock in Rainy Lake (Camsell River). Surface water data are available from 2002-2010 and 2013.

Since 2007, additional stations have been sampled in the wetland including MB-1/1A, MB-2, MB-3, MB-4, HH-1, HH-2 and HH-3. The locations of these stations are shown in Figure 2-2. Only the most recent water quality data from the last five sampling campaigns, which more accurately reflect current conditions at the site, were used in the development of the SSTL for arsenic. This dataset includes arsenic measurements collected at the aforementioned stations from 2007 to 2010 and in 2013. Mean arsenic data measured over the 2007 to 2013 period are summarized in Table 2-1.

Figures 2-3 and 2-4 provide the temporal trends in the measured data for arsenic for the entire dataset (2002 to 2013) at station T9, which as mentioned is the outlet of Ho-Hum Lake into the wetland and T6/6B, which is the outlet of the wetland into Moose Bay. As seen from Figure 2-3, there is no statistically significant temporal trend in the arsenic concentrations at station T-9 and the average concentration over the last seven years or so (2007-2013; Table 2-1) is approximately 59 µg/L. Similarly, no trends are seen in the arsenic concentrations at the outlet of the wetland (station T-6; Figure 2-4) where the average concentration is around 44 µg/L (2007-2013; Table 2-1).

Figure 2-1 Terra Mine Site Location and Site Map

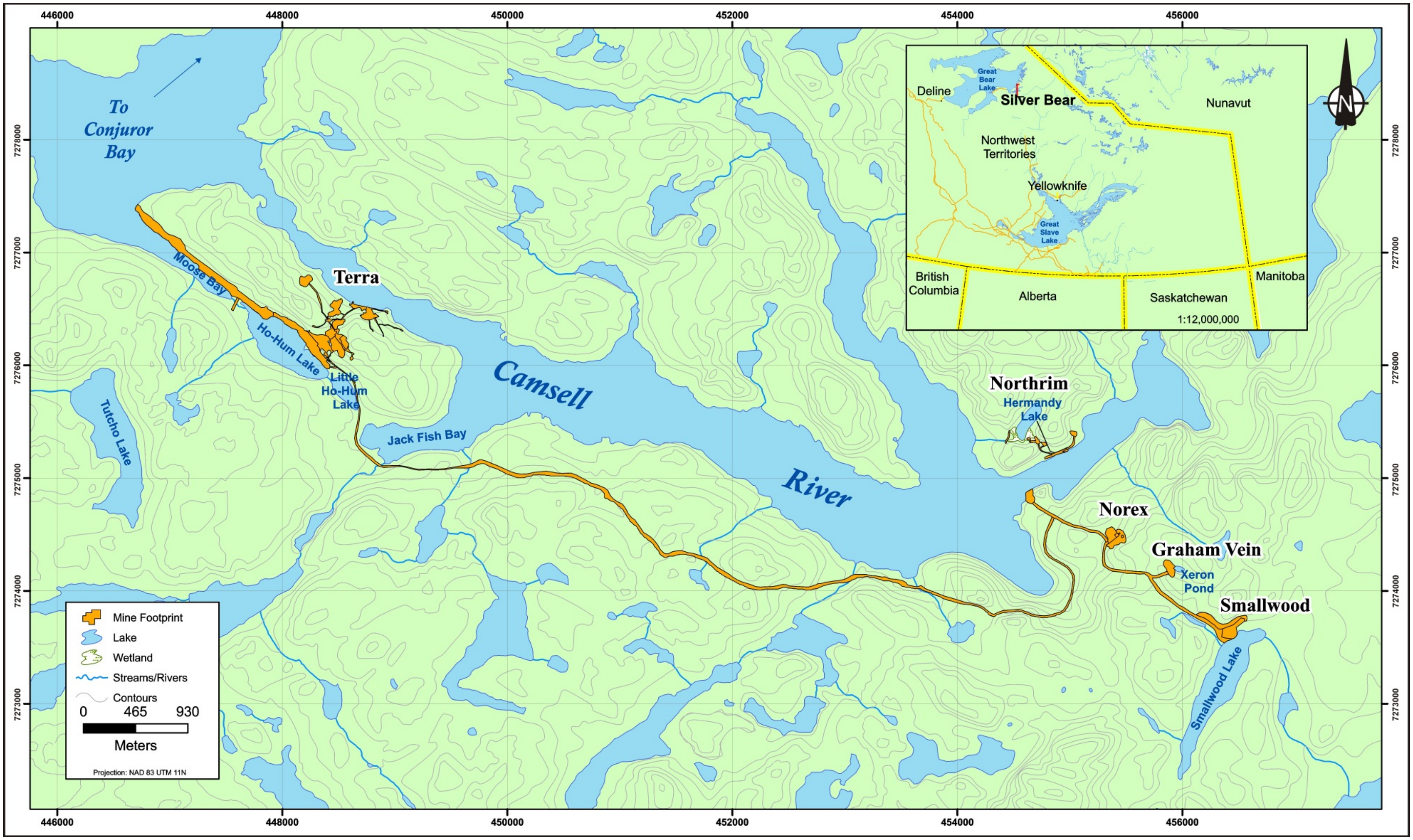
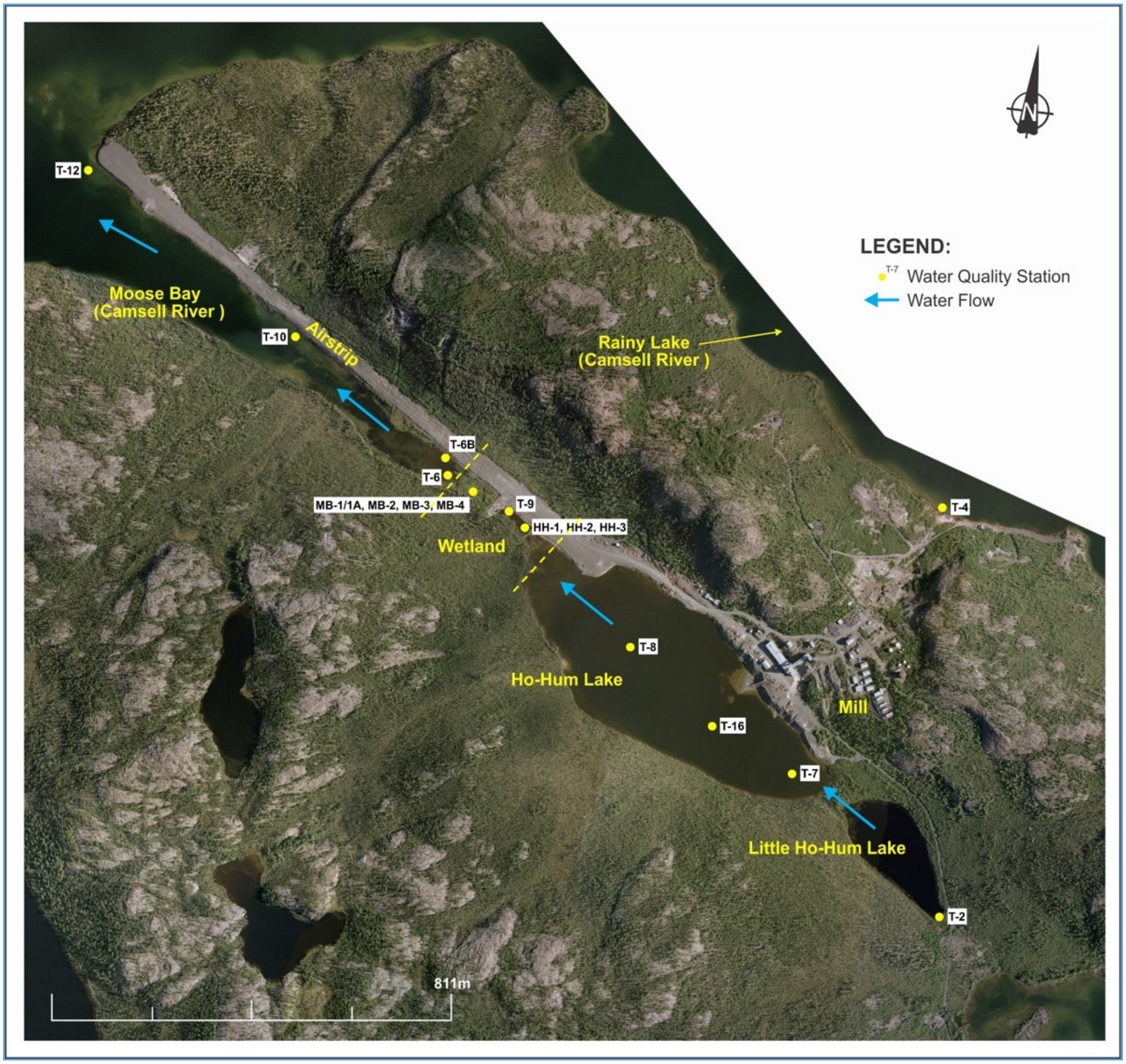


Figure 2-2 Water Quality Sampling Stations at the Terra Mine Site Included in the Assessment



Source: modified from SENES (2007).

Table 2-1 Mean Arsenic Concentrations Measured in Surface Waters at the Terra Mine Site, 2007 to 2013

Arsenic Concentration (µg/L)	Little Ho-Hum Lake	Ho-Hum Lake			Wetland		Moose Bay (Camsell River)			Rainy Lake (Camsell River)
	T-2 (n=8)	T-7* (n=12)	T-16* (n=12)	T-8* (n=12)	T-9* (n=12)	MB** (n=25)	T-6/6B (n=12)	T-10 (n=12)	T-12 (n=12)	T-4 (n=7)
Arsenic	6.90	65.5	66.6	66.3	58.9	128	43.5	0. 73	0. 51	0. 23

Note:
*includes data from surface depth only (A).
**includes data from stations MB-1, MB-1A, MB-2, MB-3, MB-4, HH-1, HH-2, and HH-3 in the wetland.

Figure 2-3 Arsenic Concentrations Measured at Station T-9 from 2002 to 2013

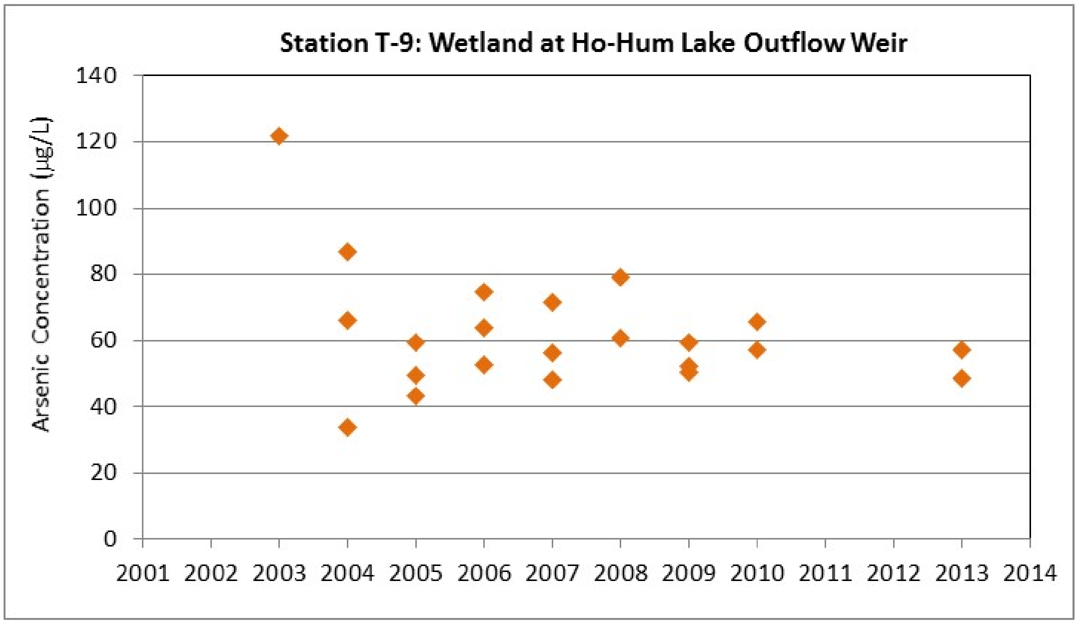
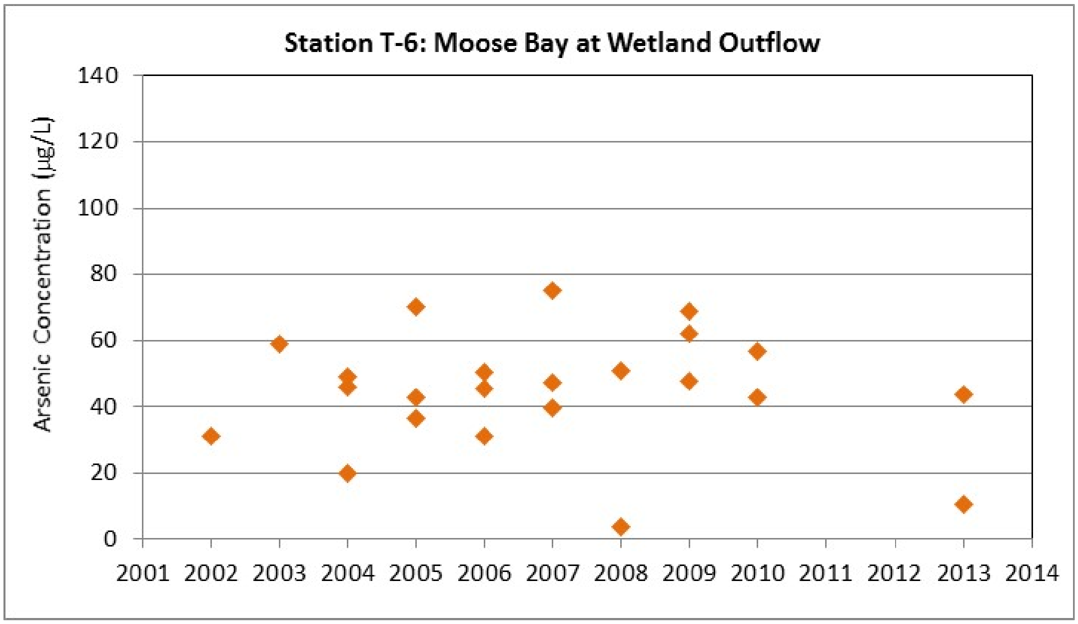


Figure 2-4 Arsenic Concentrations Measured at Station T-6 from 2002 to 2013



3.0 METHODOLOGY

This chapter provides a description of the methodology used for developing an SSTL for arsenic for surface waters associated with the wetland at the Terra Mine for the protection of aquatic life based on laboratory toxicity data, following a species sensitive distribution (SSD) approach.

Consideration was given to the drinking water guideline for the protection of human health. The drinking water guideline is based on the consumption of water every day for a lifetime. Given that the site is very remote, it was assumed that people, if they came to the site, would not drink water from the outlet of the wetland. Therefore, the arsenic SSTL in water has been developed for the protection of aquatic life.

3.1 SITE SPECIFIC TARGET LEVEL DEVELOPMENT FOR WATER

The SSTL for arsenic for surface waters at the outlet of the wetland at the Terra Mine site was developed for the protection of aquatic life based on laboratory toxicity data, following an SSD approach. The SSD is a statistical representation of the available aquatic toxicity data. In the SSD approach, data are screened for acceptable effects endpoints and all the screened data are incorporated in the determination of the SSD.

The Water Quality Task Group of the CCME has a protocol used to develop the Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME 2007a). The goals of the protocol include: (i) accounting for the unique properties of contaminants which influence their toxicity; and, (ii) incorporating the SSD method, which uses all available toxicity data (provided these data pass quality control criteria) in the development of the guideline. The SSD approach that is proposed for the Terra Mine wetland is therefore supported by the CCME protocol (CCME 2007b).

3.2 SPECIES SENSITIVE DISTRIBUTION APPROACH

The first step in the development of an SSD is to compile relevant aquatic toxicity data for the constituent. Data are generally compiled from the U.S. EPA AQUIRE database, available technical documents, and independent literature. The toxicity data available from these sources are then screened to meet the following criteria:

- Freshwater tests;
- Chronic;
- LCx, ECx, MATC endpoints only (where $x \geq 10$); and,
- Inorganic chemical form.

Toxicity tests completed in a saltwater environment, with lowest observable and no observable effect concentrations (LOEC/NOEC) reported, or with an organic form of the constituent are excluded from the dataset. Chronic tests were considered to be greater than 4 days (96 hours), and tests completed in shorter timeframes were also excluded.

Data points were also removed if the concentrations were reported as “less than”, since an accurate number could not be determined. Result concentrations reported as “greater than” were conservatively assumed to be equal to the concentration. When multiple endpoints were reported for a specific species, LC/EC10 and LC/EC20 values were selected as the endpoints of choice where the data allowed and other endpoints were dropped from the dataset. If only LC/EC50 and MATC endpoints were available, then they were grouped together.

Following the compilation of the dataset, toxicity data were grouped by species. If only one toxicity value was available for a species, then that value was used as the toxicity value for the species; however, when multiple toxicity values were available for a species, then the geometric mean of the toxicity values was calculated and assumed to represent the toxicity value for that species.

The geometric mean was selected instead of the arithmetic mean in order to minimize the bias towards high test results. Species mean values were then ranked from lowest to highest and the percent of species affected was calculated using equation (1):

$$\%\ \mathit{Affected} = \frac{\text{Rank - 0.5}}{\text{Number of Species}} \times 100 \qquad (1)$$

After manipulation of the dataset and ranking, the U.S. EPA SSD generator (2010) was then used to develop the curves for the SSDs. The U.S. EPA SSD generator applies a log-probit distribution to the dataset to develop the SSD curve. In the development of SSD curves for long term exposure, Environment Canada prefers the use of concentrations that affect 10% of the population as they are considered to be “no-effects” endpoints. Concentrations that affect 20% of the population are also used and are considered to be “low effects endpoints”. For the majority of the toxicity information for the various aquatic species exposed to arsenic, only lethal concentrations that affect 50% of the population (i.e., LC50 values) were available in the literature. These concentrations were used to derive the SSD curves.

3.3 SPECIES SENSITIVITY DISTRIBUTION FOR ARSENIC

The complete dataset for arsenic is provided in Appendix A and indicates which data points were included in the development of the SSD. Data from U.S. EPA AQUIRE were used as the basis of the dataset, with additional data obtained from a literature search. The Vocke *et al.* (1980) test result for *Scenedesmus acutus* was also considered in the development of the SSD for arsenic, since this test is the basis of the CCME (2001) arsenic water quality guideline. The aquatic toxicity data for arsenic were grouped by species (Table 3-1) and the 19 species were ranked.

The SSD curve presented in Figure 3-1 was developed using the U.S. EPA SSD generator (2010). There was a good fit for the data (r^2 = 0.951). Additional parameters describing the curve can be found in Table 3-2.

Table 3-1 Summary of Data for Development of SSD for Arsenic Aquatic Toxicity

Species	Common Name	Concentration (µg/L)	Endpoint	Geometric Mean (µg/L)	Species Rank	% Affected
Gastrophryne carolinensis	Eastern Narrow-Mouthed Toad	40	LC50	40	1	5%
Scenedesmus acutus var. acutus	Green Algae	48	EC50	48	2	11%
Gammarus fossarum	Amphipod	200	LC50	200	3	16%
Hyalella azteca	Scud	483	LC50	518	4	21%
		494	LC50			
		581	LC50			
Oncorhynchus mykiss	Rainbow Trout	540	LC50	540	5	26%
		540	LC50			
Ceriodaphnia dubia	Water Flea	1140	MATC	1,198	6	32%
		1259	EC50			
Daphnia magna	Water Flea	1300	IC10	1,300	7	37%
Physa fontinalis	Snail	2200	LC50	2,200	8	42%
Asellus aquaticus	Isopod	2310	LC50	2,310	9	47%
Niphargus rhenorhodanensis	Amphipod	3970	LC50	3,970	10	53%
Ambystoma opacum	Marbled Salamander	4450	LC50	4,450	11	58%
Coregonus hoyi	Bloater	5100	LC50	7,490	12	63%
		11000	LC50			

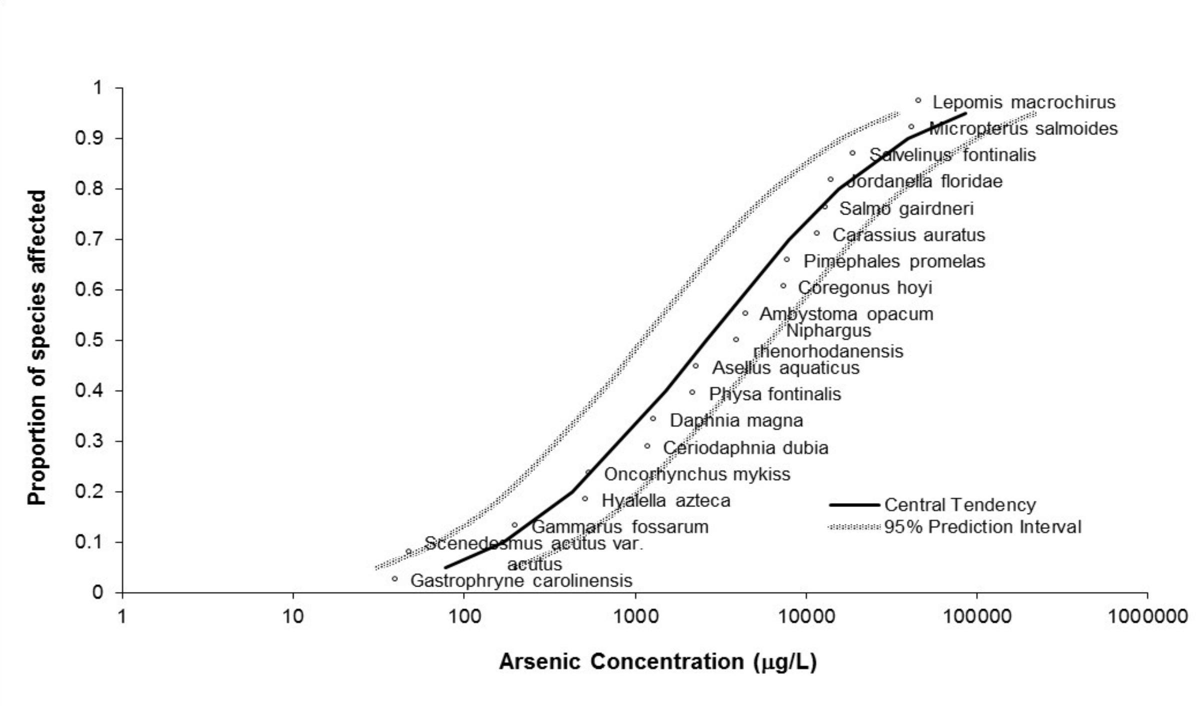
Table 3-1 Summary of Data for Development of SSD for Arsenic Aquatic Toxicity (Cont'd)

Species	Common Name	Concentration (µg/L)	Endpoint	Geometric Mean (µg/L)	Species Rank	% Affected
Pimephales promelas	Fathead Minnow	1500	MATC	7,779	13	68%
		1500	MATC			
		7079	EC50			
		11000	MATC			
		18200	LC50			
		21700	LC50			
		24900	LC50			
Carassius auratus	Goldfish	490	LC50	11,717	14	74%
		32100	LC50			
		33100	LC50			
		36200	LC50			
Salmo gairdneri	Rainbow Trout	4900	Chronic Toxicity Threshold	12,994	15	79%
		10800	LC50			
		12600	LC50			
		13300	LC50			
		13900	LC50			
		18500	LC50			
		27430	LC50			
Jordanella floridae	Flagfish	14200	EC50	14,200	16	84%
Salvelinus fontinalis	Brook Trout	18000	LC50	19,115	17	89%
		19400	LC50			
		20000	LC50			
Micropterus salmoides	Largemouth Bass	42100	LC50	42,100	18	95%
Lepomis macrochirus	Bluegill	31600	LC50	46,255	19	100%
		37000	LC50			
		42200	LC50			
		47800	LC50			
		61700	LC50			
		67300	LC50			

Table 3-2 Arsenic SSD Curve Parameters

Parameters	
Slope	1.081
Intercept	1.310
R^2	0.951
GrandMean	3.413
SumSQ	235.789
CSSQ	14.464
MSE	0.051
Tcrit	1.740
N	19
df	17

Figure 3-1 Species Sensitive Distribution for the Protection of Aquatic Life - Arsenic



3.4 APPLICATION OF SPECIES SENSITIVE DISTRIBUTION CURVE TO WETLAND

From Table 3-1, it can be seen that the available aquatic toxicity data for arsenic are predominantly LC50 values and this needs to be kept in mind when applying the SSD curve to the development of an SSTL.

There are two ways in which the SSD curve can be applied to the development of an SSTL for the outlet of the wetland: 1) using protection levels and, 2) comparing measured arsenic concentrations to the SSD curve. These two approaches are described below.

3.4.1 Protection Levels

The CCME approach allows for the use of different protection levels in site-specific applications. The CCME generally selects the concentration associated with the protection of 95% of the species (i.e., the 5% level of the SSD) when following the SSD approach for the development of water quality guidelines. This is widely considered a conservative threshold for effects to aquatic ecosystems. Due to the fact that LC50 endpoints were used for the development of the arsenic SSD, this may also be the most appropriate endpoint to use for the outlet of the wetland. However, a risk management decision can be made by the custodian whereby a different protection level is selected. Table 3-3 summarizes arsenic concentrations that are protective of

80%, 90%, and 95% of the species, based on the central tendency and upper and lower prediction intervals of the SSD curve. The specific species from the SSD potentially affected at each protection level for the central tendency are also summarized. As seen from the table, at both the 95% and 90% levels, the potential species that are affected are *Gastrophryne carolinensis* (narrow-mouth toad), *Scenedesmus acutus* (alga). The Northwest Territories is outside the expected range of the narrow-mouth toad (*Gastrophryne carolinensis)* and the 95% protection limit is considered to be protective of the aquatic ecosystem.

Table 3-3 Protection Levels Based on Arsenic Species Sensitive Distribution

Protection Level	Concentration (µg/L)			Species Affected at Central Tendency
	Central Tendency	Lower Prediction Interval	Upper Prediction Interval	
95%	78	31	196	*Gastrophryne carolinensis, Scenedesmus acutus*
90%	169	69	414	*Gastrophryne carolinensis, Scenedesmus acutus*
80%	431	180	1035	*Gastrophryne carolinensis, Scenedesmus acutus, Gammarus fossarum*

3.4.2 Measured Arsenic Concentrations

The second approach is to look at the measured arsenic concentrations from various sampling stations within and in the vicinity of the wetland and then determine where these concentrations lie on the SSD curve. Then a risk management decision can be made as to whether the species that are not protected are considered to be important to the aquatic ecosystem in the wetland.

Figure 3-2 provides an example of the SSD curve with mean arsenic concentrations measured at various stations within the wetland (T-9 and MB; see Figure 2-2) also shown on the curve. The arsenic concentrations were 59 µg/L at station T-9 and 128 µg/L at station MB (see Table 2-1). Figure 3-3 presents the curve with measured arsenic concentrations in Ho-Hum Lake (mean of stations T-7, T-16 and T-8) upstream of the wetland and Moose Bay just downstream of the wetland (T-6). The arsenic concentrations for Ho-Hum Lake (HHL) and Moose Bay (T-6) were 66 µg/L and 44 µg/L, respectively.

As seen from these figures, the potentially affected species are the narrow-mouth toad (*Gastrophryne carolinensis)* and an alga (*Scenedesmus acutus),* which are the same species that are affected when the 95% protection level is selected.

Figure 3-2 Species Sensitive Distribution with Mean Concentrations (2007-2013) Measured in the Wetland (T9, MB)

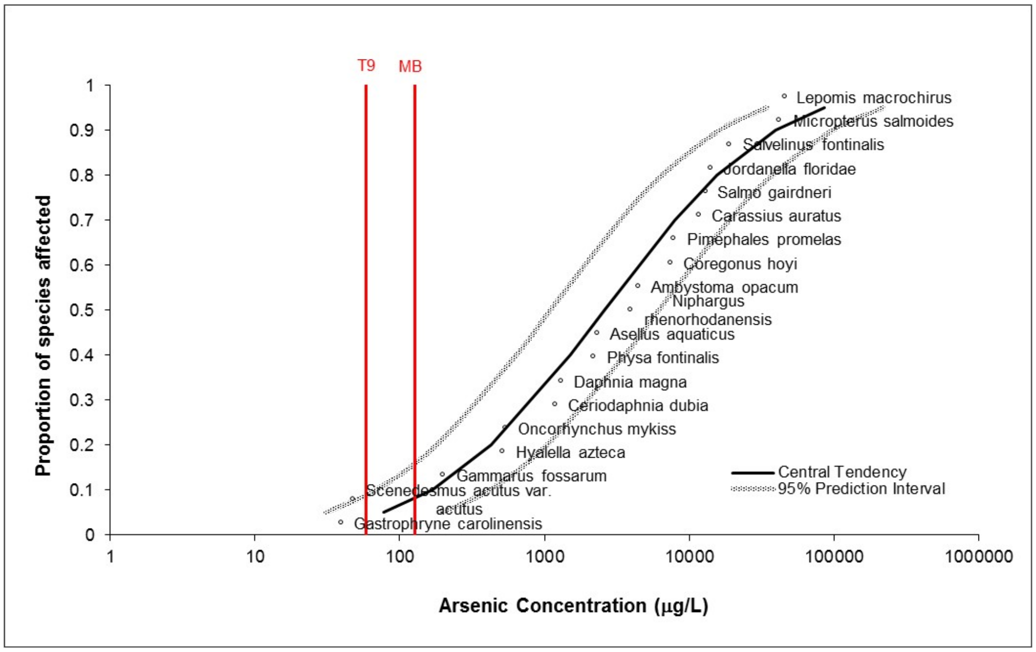
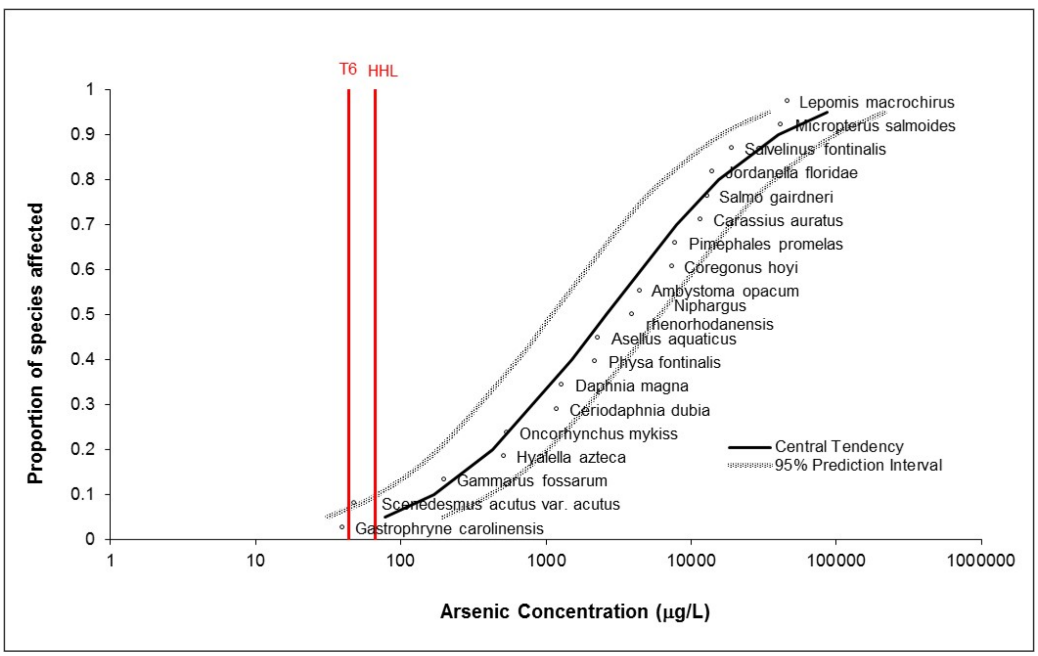


Figure 3-3 Species Sensitive Distribution with Mean Concentrations (2007-2013) Measured in Ho-Hum Lake (HHL) and Moose Bay at Wetland Outflow (T6)



3.5 APPLICATION OF THE ARSENIC SSTL FOR THE WETLAND

Based on the outcome of the two methods discussed above, it is recommended that the arsenic SSTL for the wetland at the Terra Mine site be selected as the central tendency of the arsenic SSD curve at the 95% protection level, which corresponds to a value of 78 µg/L. This value is considered to be protective of the aquatic species present in the aquatic environment at the Terra Mine site and should be applied to the outlet of the wetland into Moose Bay. Application of the SSTL to the wetland itself is not recommended as it is understood that the wetland is serving as a function to remove arsenic.

To provide a context for the derivation of the SSTL, the background related to the development of the CCME guideline is provided. The water quality guideline for arsenic for the protection of freshwater life is 5 µg/L, which was derived by multiplying the chronic 14-d EC50 for growth endpoints of approximately 50 µg/L (Vocke *et al.* 1980) for the most sensitive organism to arsenic, the alga *Scenedesmus acutus* by a safety factor of 0.1. This datum point was considered in the development of the SSD. The proposed SSTL does not protect this particular species but is protective of 95% of the species, which is considered to represent an aquatic ecosystem.

Figures 3-4 and 3-5 show a comparison between the proposed SSTL and the measured data at T-9 (inlet to wetland) and T-6 (outlet of wetland). As seen from Figure 3-4, although historically arsenic concentrations measured in June 2003 and 2004 exceeded the SSTL, with the exception of one sampling event since then in August 2008 (79 µg/L), arsenic concentrations at the inlet to the wetland have been below the SSTL concentration of 78 µg/L. At the outlet of the wetland (Figure 3-5), all arsenic concentrations measured since 2002 have been below the SSTL.

Figure 3-4 Arsenic Concentrations in Wetland Area (T-9) Relative to SSTL

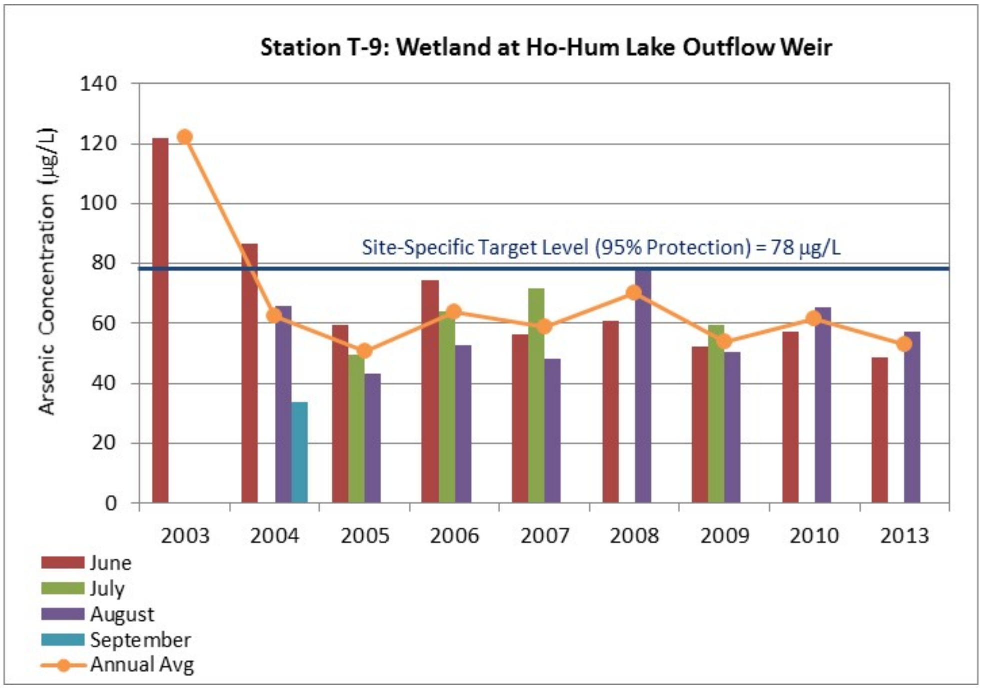
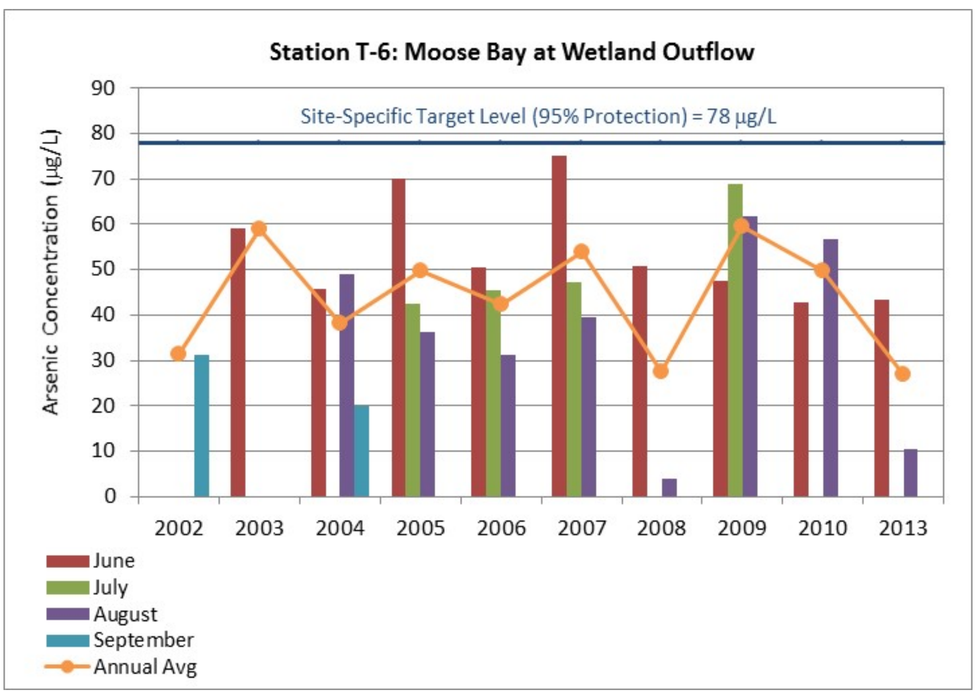


Figure 3-5 Arsenic Concentrations in Moose Bay (T6) Relative to SSTL



4.0 CONCLUSIONS

Sampling programs have been conducted in the aquatic environment at the Terra Mine site since 2002. Levels of arsenic are elevated over CCME guidelines and numerous studies have been carried out to characterize the arsenic loadings in Ho-Hum Lake, the wetland and Moose Bay. There is a need to establish an SSTL for arsenic in water at the outlet of the wetland. The proposed value of 78 µg/L for arsenic in water has been developed using an SSD approach and is representative of the protection of 95% of the aquatic species.

It is recommended that the SSTL be applied to average annual measurements at the outlet of the wetland (station T-6) as follows:

- Arsenic levels below a value of 78 µg/L are considered protective of all aquatic species and no action is required beyond routine monitoring; and,
- Arsenic levels above 78 µg/L suggest that follow-up investigations of sediments, benthic community, and fish (which do not migrate and have limited mobility) be initiated. Sampling may be warranted between stations T-6 and T-10 to determine whether adverse effects on aquatic biota populations are being observed in Moose Bay.

It should be noted that over the past number of years, the arsenic concentrations at the inlet and outlet of the wetland have essentially measured below the SSTL.

5.0 REFERENCES

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APPENDIX A:

Summary of Aquatic Toxicity Data Considered in Developing Species Sensitive Distribution Curve for Arsenic

Appendix A
Summary of Aquatic Toxicity Data Considered for Development of SSD - Arsenic

Chemical	CAS Number	Chemical Name	Species Scientific Name	Species Common Name	Organism Lifestage	Exposure Type	Chemical Analysis	Media Type	Test Location	Observed Duration Mean	Observed Duration Units	Endpoint	Trend	Effect	Effect Measurement	Conc 1 Type (ug/L)	Conc 1 Mean (ug/L)	Conc 1 Units (ug/L)	pH Mean	pH Min	pH Max	Hardness Mean	Hardness Min	Hardness Max	Hardness Units	Reference Number	Author	Title	Source	Publication Year	Comment
Arsenic	1303282	Arsenic pentoxide	Morone saxatilis	Striped Bass	-	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	30500	ug/L				475			mg/L CaCO3	11334	Palawski,D., J.B. Hunn, and F.J. Dwyer	Sensitivity of Young Striped Bass to Organic and Inorganic Contaminants in Fresh and Saline Waters	Trans. Am. Fish. Soc.114(5): 748-753	1985	test duration
Arsenic	1303282	Arsenic pentoxide	Morone saxatilis	Striped Bass	-	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	40500	ug/L				285			mg/L CaCO3	11334	Palawski,D., J.B. Hunn, and F.J. Dwyer	Sensitivity of Young Striped Bass to Organic and Inorganic Contaminants in Fresh and Saline Waters	Trans. Am. Fish. Soc.114(5): 748-753	1985	test duration
Arsenic	1303282	Arsenic pentoxide	Pimephales promelas	Fathead Minnow	-	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	42000	ug/L				285			mg/L CaCO3	11334	Palawski,D., J.B. Hunn, and F.J. Dwyer	Sensitivity of Young Striped Bass to Organic and Inorganic Contaminants in Fresh and Saline Waters	Trans. Am. Fish. Soc.114(5): 748-753	1985	test duration
Arsenic	1303282	Arsenic pentoxide	Oncorhynchus mykiss	Rainbow Trout	-	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	28000	ug/L				285			mg/L CaCO3	11334	Palawski,D., J.B. Hunn, and F.J. Dwyer	Sensitivity of Young Striped Bass to Organic and Inorganic Contaminants in Fresh and Saline Waters	Trans. Am. Fish. Soc.114(5): 748-753	1985	test duration
Arsenic	1303339	Arsenic trisulfide (As2S3)	Pimephales promelas	Fathead Minnow	-	S	M	FW	LAB	2	d	LC50	NR	mortality	mortality	T	392400*	ug/L		7.2	7.9		40	48	mg/L CaCO3	875	Curtis,M.W., T.L. Copeland, and C.H. Ward	Acute Toxicity of 12 Industrial Chemicals to Freshwater and Saltwater Organisms	Water Res.13(2): 137-141	1979	test duration
Arsenic	1303339	Arsenic trisulfide (As2S3)	Pimephales promelas	Fathead Minnow	-	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	82300*	ug/L		7.2	7.9		40	48	mg/L CaCO3	875	Curtis,M.W., T.L. Copeland, and C.H. Ward	Acute Toxicity of 12 Industrial Chemicals to Freshwater and Saltwater Organisms	Water Res.13(2): 137-141	1979	test duration
Arsenic	1327533	Arsenic oxide	Daphnia magna	Water Flea	neonate	R	M	FW	LAB	21	d	LC50	INC	mortality	mortality	D	5800	ug/L	8.1			225			mg/L CaCO3	45212	Enserink,E.L., J.L. Maas-Diepeveen, and C.J. Van Leeuwen	Combined Effects of Metals: An Ecotoxicological Evaluation	Water Res.25(6): 679-687	1991	drop in favour of IC10
Arsenic	1327533	Arsenic oxide	Coregonus hoyi	Bloater	fry	R	M	FW	LAB	14	d	LC50	NR	mortality	mortality	T	5100	ug/L					40	48	mg/L CaCO3	457	Passino,D.R.M., and J.M. Kramer	Toxicity of Arsenic and PCBs to Fry of Deepwater Ciscoes (Coregonus)	Bull. Environ. Contam. Toxicol.24(4): 527-534	1980	
Arsenic	1327533	Arsenic oxide	Coregonus hoyi	Bloater	fry	R	M	FW	LAB	5	d	LC50	NR	mortality	mortality	T	11000	ug/L					40	48	mg/L CaCO3	457	Passino,D.R.M., and J.M. Kramer	Toxicity of Arsenic and PCBs to Fry of Deepwater Ciscoes (Coregonus)	Bull. Environ. Contam. Toxicol.24(4): 527-534	1980	
Arsenic	1327533	Arsenic oxide	Coregonus hoyi	Bloater	fry	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	13000*	ug/L					40	48	mg/L CaCO3	457	Passino,D.R.M., and J.M. Kramer	Toxicity of Arsenic and PCBs to Fry of Deepwater Ciscoes (Coregonus)	Bull. Environ. Contam. Toxicol.24(4): 527-534	1980	test duration
Arsenic	1327533	Arsenic oxide	Coregonus hoyi	Bloater	fry	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	20000*	ug/L					40	48	mg/L CaCO3	457	Passino,D.R.M., and J.M. Kramer	Toxicity of Arsenic and PCBs to Fry of Deepwater Ciscoes (Coregonus)	Bull. Environ. Contam. Toxicol.24(4): 527-534	1980	test duration
Arsenic	1327533	Arsenic oxide	Oncorhynchus mykiss	Rainbow Trout	mix of lifestages	F	M	FW	LAB	6	d	LC50	NR	mortality	mortality	T	13300	ug/L	8.03						NR	6329	Dixon,D.G., and J.B. Sprague	Acclimation-Induced Changes in Toxicity of Arsenic and Cyanide to Rainbow Trout, Salmo gairdneri Richardson	J. Fish Biol.18(5): 579-589	1981	
Arsenic	1327533	Arsenic oxide	Oncorhynchus mykiss	Rainbow Trout	-	F	M	FW	LAB	6	d	LC50	NR	mortality	mortality	T	10800	ug/L							NR	395	McGeachy,S.M., and D.G. Dixon	The Impact of Temperature on the Acute Toxicity of Arsenate and Arsenite to Rainbow Trout (Salmo gairdneri)	Ecotoxicol. Environ. Saf.17(1): 86-93	1989	
Arsenic	1327533	Arsenic oxide	Oncorhynchus mykiss	Rainbow Trout	-	F	M	FW	LAB	6	d	LC50	NR	mortality	mortality	T	12600	ug/L							NR	395	McGeachy,S.M., and D.G. Dixon	The Impact of Temperature on the Acute Toxicity of Arsenate and Arsenite to Rainbow Trout (Salmo gairdneri)	Ecotoxicol. Environ. Saf.17(1): 86-93	1989	
Arsenic	1327533	Arsenic oxide	Tanytarsus dissimilis	Midge	instar	S	M	FW	LAB	2	d	LC50	NR	mortality	mortality	T	36700*	ug/L		7.2	7.7	46.6	44.6	47.5	mg/L CaCO3	10417	Holcombe,G.W., G.L. Phipps, and J.T. Fiandt	Toxicity of Selected Priority Pollutants to Various Aquatic Organisms	Ecotoxicol. Environ. Saf.7(4): 400-409	1983	test duration
Arsenic	1327533	Arsenic oxide	Aplexa hypnorum	Snail	adult	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	9280*	ug/L		7.4	7.7	49.5	45.6	53.4	mg/L CaCO3	10417	Holcombe,G.W., G.L. Phipps, and J.T. Fiandt	Toxicity of Selected Priority Pollutants to Various Aquatic Organisms	Ecotoxicol. Environ. Saf.7(4): 400-409	1983	test duration
Arsenic	1327533	Arsenic oxide	Potamopyrgus antipodarum	Snail	adult	F	M	FW	LAB	2	d	EC50	INC	intoxication	imobilization	T	34600	ug/L							NR	7583	Golding,L.A., M.H. Timperley, and C.W. Evans	Non-lethal Responses of the Freshwater Snail Potamopyrgus antipodarum to Dissolved Arsenic	Environ. Monit. Assess.47(3): 239-254	1997	test duration
Arsenic	1327533	Arsenic oxide	Potamopyrgus antipodarum	Snail	adult	F	M	FW	LAB	3	d	EC50	INC	intoxication	imobilization	T	24200	ug/L							NR	7583	Golding,L.A., M.H. Timperley, and C.W. Evans	Non-lethal Responses of the Freshwater Snail Potamopyrgus antipodarum to Dissolved Arsenic	Environ. Monit. Assess.47(3): 239-254	1997	test duration
Arsenic	1327533	Arsenic oxide	Potamopyrgus antipodarum	Snail	adult	F	M	FW	LAB	4	d	EC50	INC	intoxication	imobilization	T	19400	ug/L							NR	7583	Golding,L.A., M.H. Timperley, and C.W. Evans	Non-lethal Responses of the Freshwater Snail Potamopyrgus antipodarum to Dissolved Arsenic	Environ. Monit. Assess.47(3): 239-254	1997	test duration
Arsenic	1327533	Arsenic oxide	Potamopyrgus antipodarum	Snail	adult	F	M	FW	LAB	4	d	EC50	INC	intoxication	imobilization	T	9507	ug/L							NR	7583	Golding,L.A., M.H. Timperley, and C.W. Evans	Non-lethal Responses of the Freshwater Snail Potamopyrgus antipodarum to Dissolved Arsenic	Environ. Monit. Assess.47(3): 239-254	1997	test duration
Arsenic	7440382	Arsenic	Hyalella azteca	Scud	young organism	S	M	FW	LAB	7	d	LC50	INC	mortality	mortality	T	494	ug/L	7.39	6.4	8.5	18*			mg/L	80935	Borgmann,U., Y. Couillard, P. Doyle, and D.G. Dixon	Toxicity of Sixty-Three Metals and Metalloids to Hyalella azteca at Two Levels of Water Hardness	Environ. Toxicol. Chem.24(3): 641-652	2005	
Arsenic	7631892	Arsenic acid (H3AsO4), Sodium salt	Morone saxatilis	Striped Bass	prolarva	F	M	FW	LAB	4	d	LC50	INC	mortality	mortality	T	18690	ug/L		7.5	7.7				NR	18109	Klauda,R.J.	Acute and Chronic Effects of Waterborne Arsenic and Selenium on the Early Life Stages of Striped Bass (Morone saxatilis)	Rep.No.JHU/APL PPRP-98, Rep.to Maryland Power Plant Siting Program, John Hopkins University, Laurel, MD:209 p.	1986	test duration
Arsenic	7631892	Arsenic acid (H3AsO4), Sodium salt	Morone saxatilis	Striped Bass	larva	F	M	FW	LAB	4	d	LC50	INC	mortality	mortality	T	7280	ug/L		7.5	7.7				NR	18109	Klauda,R.J.	Acute and Chronic Effects of Waterborne Arsenic and Selenium on the Early Life Stages of Striped Bass (Morone saxatilis)	Rep.No.JHU/APL PPRP-98, Rep.to Maryland Power Plant Siting Program, John Hopkins University, Laurel, MD:209 p.	1986	test duration
Arsenic	7631892	Arsenic acid (H3AsO4), Sodium salt	Oncorhynchus mykiss	Rainbow Trout	young of year	F	M	FW	LAB	4	d	LC50	INC	mortality	mortality	T	10800	ug/L		6.4	8.3				NR	861	Hale,J.G.	Toxicity of Metal Mining Wastes	Bull. Environ. Contam. Toxicol.17(1): 66-73	1977	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Bosmina longirostris	Water Flea	neonate	S	M	FW	LAB	4	d	EC50	NR	intoxication	imobilization	T	850	ug/L	6.8			120			mg/L CaCO3	10658	Passino,D.R.M., and A.J. Novak	Toxicity of Arsenate and DDT to the Cladoceran Bosmina longirostris	Bull. Environ. Contam. Toxicol.33(3): 325-329	1984	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Daphnia pulex	Water Flea	-	S	M	FW	LAB	2	d	EC50	NR	intoxication	imobilization	T	49600	ug/L	6.8			120			mg/L CaCO3	10658	Passino,D.R.M., and A.J. Novak	Toxicity of Arsenate and DDT to the Cladoceran Bosmina longirostris	Bull. Environ. Contam. Toxicol.33(3): 325-329	1984	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Hyalella azteca	Scud	young organism	S	M	FW	LAB	7	d	LC50	INC	mortality	mortality	T	483	ug/L	8.21	7.2	8.8	124*			mg/L	80935	Borgmann,U., Y. Couillard, P. Doyle, and D.G. Dixon	Toxicity of Sixty-Three Metals and Metalloids to Hyalella azteca at Two Levels of Water Hardness	Environ. Toxicol. Chem.24(3): 641-652	2005	
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Hyalella azteca	Scud	young organism	S	M	FW	LAB	7	d	LC50	INC	mortality	mortality	T	581	ug/L	7.39	6.4	8.5	18*			mg/L	80935	Borgmann,U., Y. Couillard, P. Doyle, and D.G. Dixon	Toxicity of Sixty-Three Metals and Metalloids to Hyalella azteca at Two Levels of Water Hardness	Environ. Toxicol. Chem.24(3): 641-652	2005	
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Phoxinus phoxinus	Minnow	-	S	M	FW	LAB	0.6667	d	EC50*	NR	behavior	equilibrium	T	234000	ug/L	8.2			27.8			mg/L CaCO3	7995	Grindley,J.	Toxicity to Rainbow Trout and Minnows of Some Substances Known to be Present in Waste Water Discharged to Rivers	Ann. Appl. Biol.33:103-112	1946	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Pimephales promelas	Fathead Minnow	-	R	M	FW	LAB	1	d	LC50	INC	mortality	mortality	T	20000	ug/L	8.1*	7.9*	8.4*	140*	139*	140*	mg/L CaCO3	77828	Buhl,K.J.	The Relative Toxicity of Waterborne Inorganic Contaminants to the Rio Grande Silvery Minnow (Hybognathus amarus) and Fathead Minnow (Pimephales promelas) in a Water Quality Simulating that in the Rio Grande, New Mexico	U.S.Geol.Surv., Columbia Environ.Res.Ctr., Yankton Field Res.Stn., Yankton, SD:75 p.	2002	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Pimephales promelas	Fathead Minnow	-	R	M	FW	LAB	2	d	LC50	INC	mortality	mortality	T	19100	ug/L	8.1*	7.9*	8.4*	140*	139*	140*	mg/L CaCO3	77828	Buhl,K.J.	The Relative Toxicity of Waterborne Inorganic Contaminants to the Rio Grande Silvery Minnow (Hybognathus amarus) and Fathead Minnow (Pimephales promelas) in a Water Quality Simulating that in the Rio Grande, New Mexico	U.S.Geol.Surv., Columbia Environ.Res.Ctr., Yankton Field Res.Stn., Yankton, SD:75 p.	2002	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Pimephales promelas	Fathead Minnow	-	R	M	FW	LAB	3	d	LC50	INC	mortality	mortality	T	19100	ug/L	8.1*	7.9*	8.4*	140*	139*	140*	mg/L CaCO3	77828	Buhl,K.J.	The Relative Toxicity of Waterborne Inorganic Contaminants to the Rio Grande Silvery Minnow (Hybognathus amarus) and Fathead Minnow (Pimephales promelas) in a Water Quality Simulating that in the Rio Grande, New Mexico	U.S.Geol.Surv., Columbia Environ.Res.Ctr., Yankton Field Res.Stn., Yankton, SD:75 p.	2002	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Pimephales promelas	Fathead Minnow	-	R	M	FW	LAB	4	d	LC50	INC	mortality	mortality	T	17900	ug/L	8.1*	7.9*	8.4*	140*	139*	140*	mg/L CaCO3	77828	Buhl,K.J.	The Relative Toxicity of Waterborne Inorganic Contaminants to the Rio Grande Silvery Minnow (Hybognathus amarus) and Fathead Minnow (Pimephales promelas) in a Water Quality Simulating that in the Rio Grande, New Mexico	U.S.Geol.Surv., Columbia Environ.Res.Ctr., Yankton Field Res.Stn., Yankton, SD:75 p.	2002	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Hybognathus amarus	Rio Grande Silvery Minnow	-	R	M	FW	LAB	1	d	EC50	INC	mortality	mortality	T	41500	ug/L	8.1*	7.9*	8.4*	140*	139*	140*	mg/L CaCO3	77828	Buhl,K.J.	The Relative Toxicity of Waterborne Inorganic Contaminants to the Rio Grande Silvery Minnow (Hybognathus amarus) and Fathead Minnow (Pimephales promelas) in a Water Quality Simulating that in the Rio Grande, New Mexico	U.S.Geol.Surv., Columbia Environ.Res.Ctr., Yankton Field Res.Stn., Yankton, SD:75 p.	2002	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Hybognathus amarus	Rio Grande Silvery Minnow	-	R	M	FW	LAB	1	d	LC50	INC	mortality	mortality	T	41500	ug/L	8.1*	7.9*	8.4*	140*	139*	140*	mg/L CaCO3	77828	Buhl,K.J.	The Relative Toxicity of Waterborne Inorganic Contaminants to the Rio Grande Silvery Minnow (Hybognathus amarus) and Fathead Minnow (Pimephales promelas) in a Water Quality Simulating that in the Rio Grande, New Mexico	U.S.Geol.Surv., Columbia Environ.Res.Ctr., Yankton Field Res.Stn., Yankton, SD:75 p.	2002	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Hybognathus amarus	Rio Grande Silvery Minnow	-	R	M	FW	LAB	2	d	LC50	INC	mortality	mortality	T	39500	ug/L	8.1*	7.9*	8.4*	140*	139*	140*	mg/L CaCO3	77828	Buhl,K.J.	The Relative Toxicity of Waterborne Inorganic Contaminants to the Rio Grande Silvery Minnow (Hybognathus amarus) and Fathead Minnow (Pimephales promelas) in a Water Quality Simulating that in the Rio Grande, New Mexico	U.S.Geol.Surv., Columbia Environ.Res.Ctr., Yankton Field Res.Stn., Yankton, SD:75 p.	2002	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Hybognathus amarus	Rio Grande Silvery Minnow	-	R	M	FW	LAB	3	d	LC50	INC	mortality	mortality	T	38300	ug/L	8.1*	7.9*	8.4*	140*	139*	140*	mg/L CaCO3	77828	Buhl,K.J.	The Relative Toxicity of Waterborne Inorganic Contaminants to the Rio Grande Silvery Minnow (Hybognathus amarus) and Fathead Minnow (Pimephales promelas) in a Water Quality Simulating that in the Rio Grande, New Mexico	U.S.Geol.Surv., Columbia Environ.Res.Ctr., Yankton Field Res.Stn., Yankton, SD:75 p.	2002	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Hybognathus amarus	Rio Grande Silvery Minnow	-	R	M	FW	LAB	4	d	LC50	INC	mortality	mortality	T	34300	ug/L	8.1*	7.9*	8.4*	140*	139*	140*	mg/L CaCO3	77828	Buhl,K.J.	The Relative Toxicity of Waterborne Inorganic Contaminants to the Rio Grande Silvery Minnow (Hybognathus amarus) and Fathead Minnow (Pimephales promelas) in a Water Quality Simulating that in the Rio Grande, New Mexico	U.S.Geol.Surv., Columbia Environ.Res.Ctr., Yankton Field Res.Stn., Yankton, SD:75 p.	2002	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	1	d	LC50	NR	mortality	mortality	T	150000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	1	d	LC50	NR	mortality	mortality	T	40000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	1	d	LC50	NR	mortality	mortality	T	56000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	1	d	LC50	NR	mortality	mortality	T	62000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	1	d	LC50	NR	mortality	mortality	T	84000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	1	d	LC50	NR	mortality	mortality	T	95000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	2	d	LC50	NR	mortality	mortality	T	21000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	2	d	LC50	NR	mortality	mortality	T	26000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	2	d	LC50	NR	mortality	mortality	T	32000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	2	d	LC50	NR	mortality	mortality	T	44000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	2	d	LC50	NR	mortality	mortality	T	57000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	2	d	LC50	NR	mortality	mortality	T	78000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	3	d	LC50	NR	mortality	mortality	T	11000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	3	d	LC50	NR	mortality	mortality	T	16000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	3	d	LC50	NR	mortality	mortality	T	21000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	3	d	LC50	NR	mortality	mortality	T	26000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	3	d	LC50	NR	mortality	mortality	T	29000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	13000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	16000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	18000	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	6600	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Philodina roseola	Rotifer	adult	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	8200	ug/L							NR	2236	Schaefer,E.D., and W.O. Pipes	Temperature and the Toxicity of Chromate and Arsenate to the Rotifer, Philodina roseola	Water Res.7(12): 1781-1790	1973	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Potamopyrgus antipodarum	Snail	adult	F	M	FW	LAB	2	d	EC50	INC	intoxication	imobilization	T	325000	ug/L							NR	7583	Golding,L.A., M.H. Timperley, and C.W. Evans	Non-lethal Responses of the Freshwater Snail Potamopyrgus antipodarum to Dissolved Arsenic	Environ. Monit. Assess.47(3): 239-254	1997	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Potamopyrgus antipodarum	Snail	adult	F	M	FW	LAB	3	d	EC50	INC	intoxication	imobilization	T	135000	ug/L							NR	7583	Golding,L.A., M.H. Timperley, and C.W. Evans	Non-lethal Responses of the Freshwater Snail Potamopyrgus antipodarum to Dissolved Arsenic	Environ. Monit. Assess.47(3): 239-254	1997	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Potamopyrgus antipodarum	Snail	adult	F	M	FW	LAB	4	d	EC50	INC	intoxication	imobilization	T	111000	ug/L							NR	7583	Golding,L.A., M.H. Timperley, and C.W. Evans	Non-lethal Responses of the Freshwater Snail Potamopyrgus antipodarum to Dissolved Arsenic	Environ. Monit. Assess.47(3): 239-254	1997	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Potamopyrgus antipodarum	Snail	adult	F	M	FW	LAB	NR		EC50	INC	intoxication	imobilization	T	7444	ug/L							NR	7583	Golding,L.A., M.H. Timperley, and C.W. Evans	Non-lethal Responses of the Freshwater Snail Potamopyrgus antipodarum to Dissolved Arsenic	Environ. Monit. Assess.47(3): 239-254	1997	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Ambystoma opacum	Marbled Salamander	eggs	R	M	FW	LAB	8	d	LC50	NR	mortality	mortality	T	4450	ug/L		7.2	7.8		93	105	mg/L CaCO3	6199	Birge,W.J., J.E. Hudson, J.A. Black, and A.G. Westerman	Embryo-Larval Bioassays on Inorganic Coal Elements and In Situ Biomonitoring of Coal-Waste Effluents	In: Symp., U.S.Fish Wildl.Serv., Dec.3-6, 1978, Surface Mining Fish Wildl.needs in Eastern U.S., WV:97-104	1978	
Arsenic	7784465	Arsenenous acid, Sodium salt	Gastrophryne carolinensis	Eastern Narrow-Mouthed Toad	eggs	R	M	FW	LAB	7	d	LC50	INC	mortality	mortality	T	40	ug/L	7.4			195			mg/L CaCO3	5305	Birge,W.J.	Aquatic Toxicology of Trace Elements of Coal and Fly Ash	In: J.H.Thorp and J.W.Gibbons (Eds.), Dep.Energy Symp.Ser., Energy and Environmental Stress in Aquatic Systems, Augusta, GA48:219-240	1978	
Arsenic	7784465	Arsenenous acid, Sodium salt	Ceriodaphnia dubia	Water Flea	-	R	M	FW	LAB	7	d	EC50	DEC	reproduction	progeny counts	D	1259	ug/L	8.2	8	8.5	100			mg/L CaCO3	12093	Spehar,R.L., and J.T. Fiandt	Acute and Chronic Effects of Water Quality Criteria-Based Metal Mixtures on Three Aquatic Species	Environ. Toxicol. Chem.5(10): 917-931	1986	
Arsenic	7784465	Arsenenous acid, Sodium salt	Daphnia magna	Water Flea	instar	S	M	FW	LAB	2	d	EC50	INC	intoxication	imobilization	T	4830	ug/L	8.1			48.7			mg/L CaCO3	10579	Call,D.J., L.T. Brooke, N. Ahmad, and J.E. Richter	Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms	EPA 600/3-83-095, U.S.EPA, Duluth, MN:120 p.	1983	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Daphnia magna	Water Flea	-	S	M	FW	LAB	1	d	EC50	INC	intoxication	imobilization	T	2160	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Daphnia magna	Water Flea	-	S	M	FW	LAB	1	d	EC50	INC	intoxication	imobilization	T	7250	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Daphnia magna	Water Flea	-	S	M	FW	LAB	2	d	EC50	INC	intoxication	imobilization	T	1500	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Daphnia magna	Water Flea	-	S	M	FW	LAB	2	d	EC50	INC	intoxication	imobilization	T	4630	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Daphnia magna	Water Flea	-	S	M	FW	LAB	3	d	EC50	INC	intoxication	imobilization	T	1500	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Daphnia magna	Water Flea	-	S	M	FW	LAB	3	d	EC50	INC	intoxication	imobilization	T	4630	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Daphnia magna	Water Flea	-	S	M	FW	LAB	4	d	EC50	INC	intoxication	imobilization	T	1500	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Daphnia magna	Water Flea	-	S	M	FW	LAB	4	d	EC50	INC	intoxication	imobilization	T	4340	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Gammarus pseudolimnaeus	Scud	-	F	M	FW	LAB	1.7917	d	EC50	INC	intoxication	imobilization	T	1990	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Gammarus pseudolimnaeus	Scud	-	F	M	FW	LAB	2.6667	d	EC50	INC	intoxication	imobilization	T	1020	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration

Arsenic	7784465	Arsenenous acid, Sodium salt	Gammarus pseudolimnaeus	Scud	-	F	M	FW	LAB	4	d	EC50	INC	intoxication	imobilization	T	874	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Ceriodaphnia dubia	Water Flea	-	S	M	FW	LAB	2	d	LC50	INC	mortality	mortality	D	1448	ug/L	8.2	8	8.5	100			mg/L CaCO3	12093	Spehar,R.L., and J.T. Fiandt	Acute and Chronic Effects of Water Quality Criteria-Based Metal Mixtures on Three Aquatic Species	Environ. Toxicol. Chem.5(10): 917-931	1986	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Gammarus pseudolimnaeus	Scud	-	F	M	FW	LAB	1.8125	d	LC50	NR	mortality	mortality	T	1990	ug/L	7.7			46.3			mg/L CaCO3	10579	Call,D.J., L.T. Brooke, N. Ahmad, and J.E. Richter	Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms	EPA 600/3-83-095, U.S.EPA, Duluth, MN:120 p.	1983	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Gammarus pseudolimnaeus	Scud	-	F	M	FW	LAB	3	d	LC50	NR	mortality	mortality	T	875	ug/L	7.7			46.3			mg/L CaCO3	10579	Call,D.J., L.T. Brooke, N. Ahmad, and J.E. Richter	Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms	EPA 600/3-83-095, U.S.EPA, Duluth, MN:120 p.	1983	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Gammarus pseudolimnaeus	Scud	-	F	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	875	ug/L	7.7			46.3			mg/L CaCO3	10579	Call,D.J., L.T. Brooke, N. Ahmad, and J.E. Richter	Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms	EPA 600/3-83-095, U.S.EPA, Duluth, MN:120 p.	1983	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Ceriodaphnia dubia	Water Flea	-	R	M	FW	LAB	7	d	MATC	DEC	reproduction	progeny counts	D	1140	ug/L	8.2	8	8.5	100			mg/L CaCO3	12093	Spehar,R.L., and J.T. Fiandt	Acute and Chronic Effects of Water Quality Criteria-Based Metal Mixtures on Three Aquatic Species	Environ. Toxicol. Chem.5(10): 917-931	1986	
Arsenic	7784465	Arsenenous acid, Sodium salt	Notemigonus crysoleucas	Golden Shiner	-	S	M	FW	LAB	4	d	EC50	NR	avoidance	chemical avoidance	T	28	ug/L							NR	3286	Hartwell,S.I., J.H. Jin, D.S. Cherry, and J.,Jr. Cairns	Toxicity Versus Avoidance Response of Golden Shiner, Notemigonus crysoleucas, to Five Metals	J. Fish Biol.35(3): 447-456	1989	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Esox masquinongy	Muskellunge	fry	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	16000	ug/L		7.6	7.8				NR	8449	Spotila,J.R., and F.V. Paladino	Toxicity of Arsenic to Developing Muskellunge Fry (Esox masquinongy)	Comp. Biochem. Physiol. C Comp. Pharmacol.62(1): 67-69	1979	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Esox masquinongy	Muskellunge	fry	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	2600	ug/L		7.8	7.9				NR	8449	Spotila,J.R., and F.V. Paladino	Toxicity of Arsenic to Developing Muskellunge Fry (Esox masquinongy)	Comp. Biochem. Physiol. C Comp. Pharmacol.62(1): 67-69	1979	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Esox masquinongy	Muskellunge	swim-up	S	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	1100	ug/L		7.2	7.7				NR	8449	Spotila,J.R., and F.V. Paladino	Toxicity of Arsenic to Developing Muskellunge Fry (Esox masquinongy)	Comp. Biochem. Physiol. C Comp. Pharmacol.62(1): 67-69	1979	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Micropterus salmoides	Largemouth Bass	eggs	R	M	FW	LAB	8	d	LC50	NR	mortality	mortality	T	42100	ug/L		7.2	7.8		93	105	mg/L CaCO3	6199	Birge,W.J., J.E. Hudson, J.A. Black, and A.G. Westerman	Embryo-Larval Bioassays on Inorganic Coal Elements and In Situ Biomonitoring of Coal-Waste Effluents	In: Symp., U.S.Fish Wildl.Serv., Dec.3-6, 1978, Surface Mining Fish Wildl.needs in Eastern U.S., WV:97-104	1978	
Arsenic	7784465	Arsenenous acid, Sodium salt	Notropis hudsonius	Spottail Shiner	juveniles	S	M	FW	LAB	1	d	LC50	INC	mortality	mortality	T	45000	ug/L	7.8						NR	10290	Boschetti,M.M., and T.F. McLoughlin	Toxicity of Sodium Arsenite to Minnows	Sanitalk5:14-18	1957	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Notropis hudsonius	Spottail Shiner	juveniles	S	M	FW	LAB	2	d	LC50	INC	mortality	mortality	T	29000	ug/L	7.8						NR	10290	Boschetti,M.M., and T.F. McLoughlin	Toxicity of Sodium Arsenite to Minnows	Sanitalk5:14-18	1957	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Notropis hudsonius	Spottail Shiner	juveniles	S	M	FW	LAB	3	d	LC50	INC	mortality	mortality	T	27000	ug/L	7.8						NR	10290	Boschetti,M.M., and T.F. McLoughlin	Toxicity of Sodium Arsenite to Minnows	Sanitalk5:14-18	1957	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Jordanella floridae	Flagfish	embryo	F	M	FW	LAB	31	d	EC50	INC	mortality	mortality	T	14200	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	
Arsenic	7784465	Arsenenous acid, Sodium salt	Jordanella floridae	Flagfish	-	F	M	FW	LAB	4	d	EC50	NR	behavior	equilibrium	T	14200	ug/L	7.2	7	7.4	50.1	49	57	mg/L CaCO3	5940	Call,D.J., L.T. Brooke, and N. Ahmad	Estimates of "No Effect" Concentrations of Selected Pesticides in Freshwater Organisms	Third Quarterly Prog.Rep.to EPA, EPA Coop.Agreement No.CR 806864030, Univ.of Wisconsin, Superior, WI:37 p.	1980	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Jordanella floridae	Flagfish	-	F	M	FW	LAB	4	d	EC50	NR	behavior	equilibrium	T	14200	ug/L	7.2	7	7.4	50.1	49	57	mg/L CaCO3	5940	Call,D.J., L.T. Brooke, and N. Ahmad	Estimates of "No Effect" Concentrations of Selected Pesticides in Freshwater Organisms	Third Quarterly Prog.Rep.to EPA, EPA Coop.Agreement No.CR 806864030, Univ.of Wisconsin, Superior, WI:37 p.	1980	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	-	F	M	FW	LAB	32	d	EC50	DEC	growth	weight	D	7079	ug/L	7.4	6	8.1	43.9			mg/L CaCO3	12093	Spehar,R.L., and J.T. Fiandt	Acute and Chronic Effects of Water Quality Criteria-Based Metal Mixtures on Three Aquatic Species	Environ. Toxicol. Chem.5(10): 917-931	1986	
Arsenic	7784465	Arsenenous acid, Sodium salt	Jordanella floridae	Flagfish	fry	F	M	FW	LAB	1	d	LC50	INC	mortality	mortality	T	18300	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Jordanella floridae	Flagfish	fry	F	M	FW	LAB	1.2083	d	LC50	NR	mortality	mortality	T	69800	ug/L							NR	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Jordanella floridae	Flagfish	fry	F	M	FW	LAB	2	d	LC50	INC	mortality	mortality	T	16200	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Jordanella floridae	Flagfish	fry	F	M	FW	LAB	2.7917	d	LC50	NR	mortality	mortality	T	60800	ug/L							NR	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Jordanella floridae	Flagfish	fry	F	M	FW	LAB	3	d	LC50	INC	mortality	mortality	T	15900	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Jordanella floridae	Flagfish	fry	F	M	FW	LAB	3.875	d	LC50	NR	mortality	mortality	T	40400	ug/L							NR	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Jordanella floridae	Flagfish	fry	F	M	FW	LAB	3.875	d	LC50	NR	mortality	mortality	T	49600	ug/L							NR	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Jordanella floridae	Flagfish	fry	F	M	FW	LAB	3.875	d	LC50	NR	mortality	mortality	T	55500	ug/L							NR	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Jordanella floridae	Flagfish	fry	F	M	FW	LAB	4	d	LC50	INC	mortality	mortality	T	14400	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Lepomis macrochirus	Bluegill	juveniles	F	M	FW	LAB	1.7917	d	LC50	NR	mortality	mortality	T	60800	ug/L	7.98			140			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Lepomis macrochirus	Bluegill	juveniles	F	M	FW	LAB	10	d	LC50	NR	mortality	mortality	T	47800	ug/L	7.82			147			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	
Arsenic	7784465	Arsenenous acid, Sodium salt	Lepomis macrochirus	Bluegill	juveniles	F	M	FW	LAB	11	d	LC50	NR	mortality	mortality	T	42200	ug/L	7.82			147			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	
Arsenic	7784465	Arsenenous acid, Sodium salt	Lepomis macrochirus	Bluegill	juveniles	F	M	FW	LAB	12	d	LC50	NR	mortality	mortality	T	37000	ug/L	7.82			147			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	
Arsenic	7784465	Arsenenous acid, Sodium salt	Lepomis macrochirus	Bluegill	juveniles	F	M	FW	LAB	14	d	LC50	NR	mortality	mortality	T	31600	ug/L	7.82			147			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	
Arsenic	7784465	Arsenenous acid, Sodium salt	Lepomis macrochirus	Bluegill	juveniles	F	M	FW	LAB	2	d	LC50	NR	mortality	mortality	T	56900	ug/L	7.98			140			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Lepomis macrochirus	Bluegill	juveniles	F	M	FW	LAB	2.7917	d	LC50	NR	mortality	mortality	T	47500	ug/L	7.98			140			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Lepomis macrochirus	Bluegill	juveniles	F	M	FW	LAB	3.2083	d	LC50	NR	mortality	mortality	T	44500	ug/L	7.98			140			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Lepomis macrochirus	Bluegill	juveniles	F	M	FW	LAB	3.8333	d	LC50	NR	mortality	mortality	T	33300	ug/L	7.98			140			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Lepomis macrochirus	Bluegill	juveniles	F	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	31200	ug/L	7.98			140			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Lepomis macrochirus	Bluegill	juveniles	F	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	72000	ug/L	7.82			147			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Lepomis macrochirus	Bluegill	juveniles	F	M	FW	LAB	5	d	LC50	NR	mortality	mortality	T	67300	ug/L	7.82			147			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	
Arsenic	7784465	Arsenenous acid, Sodium salt	Lepomis macrochirus	Bluegill	juveniles	F	M	FW	LAB	7	d	LC50	NR	mortality	mortality	T	61700	ug/L	7.82			147			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	fry	F	M	FW	LAB	1	d	LC50	INC	mortality	mortality	T	18900	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	fry	F	M	FW	LAB	2	d	LC50	INC	mortality	mortality	T	15800	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	fry	F	M	FW	LAB	3	d	LC50	INC	mortality	mortality	T	14700	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	fry	F	M	FW	LAB	4	d	LC50	INC	mortality	mortality	T	14100	ug/L		7.2	8.1		46.3	49.9	mg/L CaCO3	10695	Lima,A.R., C. Curtis, D.E. Hammermeister, T.P. Markee, C.E. Northcott, and L.T. Brooke	Acute and Chronic Toxicities of Arsenic(III) to Fathead Minnows, Flagfish, Daphnids, and an Amphipod	Arch. Environ. Contam. Toxicol.13(5): 595-601	1984	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	juveniles	F	M	FW	LAB	0.5833	d	LC50	NR	mortality	mortality	T	45300	ug/L	7.77			149			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	juveniles	F	M	FW	LAB	0.6667	d	LC50	NR	mortality	mortality	T	41700	ug/L	7.77			149			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	juveniles	F	M	FW	LAB	1	d	LC50	NR	mortality	mortality	T	36200	ug/L	7.77			149			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	juveniles	F	M	FW	LAB	11.7917	d	LC50	NR	mortality	mortality	T	21700	ug/L	7.77			149			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	juveniles	F	M	FW	LAB	14	d	LC50	NR	mortality	mortality	T	18200	ug/L	7.77			149			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	juveniles	F	M	FW	LAB	2	d	LC50	NR	mortality	mortality	T	31300	ug/L	7.77			149			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	juveniles	F	M	FW	LAB	3	d	LC50	NR	mortality	mortality	T	29200	ug/L	7.77			149			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	juveniles	F	M	FW	LAB	4	d	LC50	INC	mortality	mortality	T	23600	ug/L	7.8*			45*			mg/L CaCO3	15031	Broderius,S.J., M.D. Kahl, and M.D. Hoglund	Use of Joint Toxic Response to Define the Primary Mode of Toxic Action for Diverse Industrial Organic Chemicals	Environ. Toxicol. Chem.14(9): 1591-1605	1995	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	juveniles	F	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	27000	ug/L	7.77			149			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	juveniles	F	M	FW	LAB	7.7917	d	LC50	NR	mortality	mortality	T	24900	ug/L	7.77			149			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	-	F	M	FW	LAB	4	d	LC50	INC	mortality	mortality	D	12600	ug/L	7.4	6	8.1	43.9			mg/L CaCO3	12093	Spehar,R.L., and J.T. Fiandt	Acute and Chronic Effects of Water Quality Criteria-Based Metal Mixtures on Three Aquatic Species	Environ. Toxicol. Chem.5(10): 917-931	1986	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Salvelinus fontinalis	Brook Trout	adult	F	M	FW	LAB	0.9167	d	LC50	NR	mortality	mortality	T	54100	ug/L	7.75			152			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Salvelinus fontinalis	Brook Trout	adult	F	M	FW	LAB	1	d	LC50	NR	mortality	mortality	T	53900	ug/L	7.75			152			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Salvelinus fontinalis	Brook Trout	adult	F	M	FW	LAB	1.25	d	LC50	NR	mortality	mortality	T	40800	ug/L	7.75			152			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Salvelinus fontinalis	Brook Trout	adult	F	M	FW	LAB	1.2917	d	LC50	NR	mortality	mortality	T	42200	ug/L	7.75			152			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Salvelinus fontinalis	Brook Trout	adult	F	M	FW	LAB	10.9167	d	LC50	NR	mortality	mortality	T	18000	ug/L	7.75			152			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	
Arsenic	7784465	Arsenenous acid, Sodium salt	Salvelinus fontinalis	Brook Trout	adult	F	M	FW	LAB	2	d	LC50	NR	mortality	mortality	T	27800	ug/L	7.75			152			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Salvelinus fontinalis	Brook Trout	adult	F	M	FW	LAB	3.875	d	LC50	NR	mortality	mortality	T	25800	ug/L	7.75			152			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Salvelinus fontinalis	Brook Trout	adult	F	M	FW	LAB	6	d	LC50	NR	mortality	mortality	T	20000	ug/L	7.75			152			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	
Arsenic	7784465	Arsenenous acid, Sodium salt	Salvelinus fontinalis	Brook Trout	adult	F	M	FW	LAB	6.8333	d	LC50	NR	mortality	mortality	T	19400	ug/L	7.75			152			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	embryo	F	M	FW	LAB	30	d	MATC	DEC	mortality	survival	T	11000	ug/L	7.17			49.13			mg/L CaCO3	150898	Call,D.J., and D.L. Geiger	Subchronic Toxicities of Industrial and Agricultural Chemicals to Fathead Minnows (Pimephales promelas), Volume I	Center for Lake Superior Environmental Studies, University of Wisconsin, Superior, WI:318 p.	1992	
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	embryo	F	M	FW	LAB	NR	ht	MATC	DEC	developmen	normal	T	16500	ug/L	7.17			49.13			mg/L CaCO3	150898	Call,D.J., and D.L. Geiger	Subchronic Toxicities of Industrial and Agricultural Chemicals to Fathead Minnows (Pimephales promelas), Volume I	Center for Lake Superior Environmental Studies, University of Wisconsin, Superior, WI:318 p.	1992	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	embryo	F	M	FW	LAB	30	d	MATC	DEC	growth	length	T	1500	ug/L	7.17			49.13			mg/L CaCO3	150898	Call,D.J., and D.L. Geiger	Subchronic Toxicities of Industrial and Agricultural Chemicals to Fathead Minnows (Pimephales promelas), Volume I	Center for Lake Superior Environmental Studies, University of Wisconsin, Superior, WI:318 p.	1992	
Arsenic	7784465	Arsenenous acid, Sodium salt	Pimephales promelas	Fathead Minnow	embryo	F	M	FW	LAB	30	d	MATC	DEC	growth	weight	T	1500	ug/L	7.17			49.13			mg/L CaCO3	150898	Call,D.J., and D.L. Geiger	Subchronic Toxicities of Industrial and Agricultural Chemicals to Fathead Minnows (Pimephales promelas), Volume I	Center for Lake Superior Environmental Studies, University of Wisconsin, Superior, WI:318 p.	1992	
Arsenic	7784465	Arsenenous acid, Sodium salt	Oncorhynchus mykiss	Rainbow Trout	eggs	R	M	FW	LAB	28	d	LC50	INC	mortality	mortality	T	540	ug/L	7.4			104			mg/L CaCO3	5305	Birge,W.J.	Aquatic Toxicology of Trace Elements of Coal and Fly Ash	In: J.H.Thorp and J.W.Gibbons (Eds.), Dep.Energy Symp.Ser., Energy and Environmental Stress in Aquatic Systems, Augusta, GA48:219-240	1978	
Arsenic	7784465	Arsenenous acid, Sodium salt	Oncorhynchus mykiss	Rainbow Trout	eggs	R	M	FW	LAB	28	d	LC50	NR	mortality	mortality	T	540	ug/L		7.2	7.8		93	105	mg/L CaCO3	6199	Birge,W.J., J.E. Hudson, J.A. Black, and A.G. Westerman	Embryo-Larval Bioassays on Inorganic Coal Elements and In Situ Biomonitoring of Coal-Waste Effluents	In: Symp., U.S.Fish Wildl.Serv., Dec.3-6, 1978, Surface Mining Fish Wildl.needs in Eastern U.S., WV:97-104	1978	
Arsenic	7784465	Arsenenous acid, Sodium salt	Oncorhynchus mykiss	Rainbow Trout	-	F	M	FW	LAB	6	d	LC50	NR	mortality	mortality	T	13900	ug/L							NR	395	McGeachy,S.M., and D.G. Dixon	The Impact of Temperature on the Acute Toxicity of Arsenate and Arsenite to Rainbow Trout (Salmo gairdneri)	Ecotoxicol. Environ. Saf.17(1): 86-93	1989	
Arsenic	7784465	Arsenenous acid, Sodium salt	Oncorhynchus mykiss	Rainbow Trout	-	F	M	FW	LAB	6	d	LC50	NR	mortality	mortality	T	27430	ug/L							NR	395	McGeachy,S.M., and D.G. Dixon	The Impact of Temperature on the Acute Toxicity of Arsenate and Arsenite to Rainbow Trout (Salmo gairdneri)	Ecotoxicol. Environ. Saf.17(1): 86-93	1989	
Arsenic	7784465	Arsenenous acid, Sodium salt	Carassius auratus	Goldfish	eggs	R	M	FW	LAB	7	d	LC50	INC	mortality	mortality	T	490	ug/L	7.4			195			mg/L CaCO3	5305	Birge,W.J.	Aquatic Toxicology of Trace Elements of Coal and Fly Ash	In: J.H.Thorp and J.W.Gibbons (Eds.), Dep.Energy Symp.Ser., Energy and Environmental Stress in Aquatic Systems, Augusta, GA48:219-240	1978	
Arsenic	7784465	Arsenenous acid, Sodium salt	Carassius auratus	Goldfish	juveniles	F	M	FW	LAB	0.25	d	LC50	NR	mortality	mortality	T	211200	ug/L	7.61			148			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Carassius auratus	Goldfish	juveniles	F	M	FW	LAB	0.75	d	LC50	NR	mortality	mortality	T	103100	ug/L	7.61			148			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Carassius auratus	Goldfish	juveniles	F	M	FW	LAB	1	d	LC50	NR	mortality	mortality	T	89600	ug/L	7.61			148			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Carassius auratus	Goldfish	juveniles	F	M	FW	LAB	1.5	d	LC50	NR	mortality	mortality	T	60800	ug/L	7.61			148			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Carassius auratus	Goldfish	juveniles	F	M	FW	LAB	10	d	LC50	NR	mortality	mortality	T	33100	ug/L	7.61			148			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	
Arsenic	7784465	Arsenenous acid, Sodium salt	Carassius auratus	Goldfish	juveniles	F	M	FW	LAB	14	d	LC50	NR	mortality	mortality	T	32100	ug/L	7.61			148			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	

Appendix A
Summary of Aquatic Toxicity Data Considered for Development of SSD - Arsenic

Arsenic	7784465	Arsenenous acid, Sodium salt	Carassius auratus	Goldfish	juveniles	F	M	FW	LAB	2	d	LC50	NR	mortality	mortality	T	54600	ug/L	7.61			148			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Carassius auratus	Goldfish	juveniles	F	M	FW	LAB	3	d	LC50	NR	mortality	mortality	T	50000	ug/L	7.61			148			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Carassius auratus	Goldfish	juveniles	F	M	FW	LAB	4	d	LC50	NR	mortality	mortality	T	44900	ug/L	7.61			148			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	test duration
Arsenic	7784465	Arsenenous acid, Sodium salt	Carassius auratus	Goldfish	juveniles	F	M	FW	LAB	7	d	LC50	NR	mortality	mortality	T	36200	ug/L	7.61			148			mg/L CaCO3	838	Cardwell,R.D., D.G. Foreman, T.R. Payne, and D.J. Wilbur	Acute Toxicity of Selected Toxicants to Six Species of Fish	EPA-600/3-76-008, U.S.EPA, Duluth, MN:125 p.	1976	
Arsenic	13464374	Arsenous acid, Trisodium salt	Simocephalus serrulatus	Water Flea	-	NR	M	FW	LAB	2	d	EC50	INC	mortality	mortality	T	1400	ug/L							NR	10337	Cope,O.B.	Contamination of the Freshwater Ecosystem by Pesticides	J. Appl. Ecol.3:33-44	1966	test duration
Arsenic	13464374	Arsenous acid, Trisodium salt	Daphnia pulex	Water Flea	-	NR	M	FW	LAB	2	d	EC50	INC	mortality	mortality	T	1800	ug/L							NR	10337	Cope,O.B.	Contamination of the Freshwater Ecosystem by Pesticides	J. Appl. Ecol.3:33-44	1966	test duration
Arsenic	13464374	Arsenous acid, Trisodium salt	Lepomis macrochirus	Bluegill	-	NR	M	FW	LAB	2	d	EC50	INC	mortality	mortality	T	44000	ug/L							NR	10337	Cope,O.B.	Contamination of the Freshwater Ecosystem by Pesticides	J. Appl. Ecol.3:33-44	1966	test duration
Arsenic	13464374	Arsenous acid, Trisodium salt	Oncorhynchus mykiss	Rainbow Trout	-	NR	M	FW	LAB	2	d	EC50	INC	mortality	mortality	T	36500	ug/L							NR	10337	Cope,O.B.	Contamination of the Freshwater Ecosystem by Pesticides	J. Appl. Ecol.3:33-44	1966	test duration
Arsenic	13464374	Arsenous acid, Trisodium salt	Pteronarcys californica	Stonefly	nymphs	NR	M	FW	LAB	2	d	EC50	INC	mortality	mortality	T	80000	ug/L							NR	10337	Cope,O.B.	Contamination of the Freshwater Ecosystem by Pesticides	J. Appl. Ecol.3:33-44	1966	test duration
Arsenic		Arsenite	Oncorhynchus mykiss	Rainbow Trout				FW	LAB	6	d	LC50					18500	ug/L	7.8			380			mg/L CaCO3		Rankin and Dixon			1994	
Arsenic		Arsenite	Oncorhynchus mykiss	Rainbow Trout				FW	LAB	181	d	Chronic Toxicity Threshold			growth and eating		4900	ug/L	7.8			380			mg/L CaCO3		Rankin and Dixon			1994	
Arsenic		sodium arsenite	Gammarus fossarum	Amphipod				FW	LAB	10	d	LC50					200	ug/L									Canivet, Chambon, Gibert			2001	
Arsenic		sodium arsenite	Niphargus rhenorhodanensis	Amphipod				FW	LAB	10	d	LC50					3970	ug/L									Canivet, Chambon, Gibert			2001	
Arsenic		sodium arsenite	Asellus aquaticus	Isopod				FW	LAB	10	d	LC50					2310	ug/L									Canivet, Chambon, Gibert			2001	
Arsenic		sodium arsenite	Heptagenia sulphurea	Insect				FW	LAB	10	d	LC50					1600	ug/L									Canivet, Chambon, Gibert			2001	test species
Arsenic		sodium arsenite	Hydropsiche pellucidula	Insect				FW	LAB	10	d	LC50					2400	ug/L									Canivet, Chambon, Gibert			2001	test species
Arsenic		sodium arsenite	Physa fontinalis	Snail				FW	LAB	10	d	LC50					2200	ug/L									Canivet, Chambon, Gibert			2001	
Arsenic		Arsenic oxide	Daphnia magna	Water Flea				FW	LAB	21	d	IC10					1300	ug/L									Tisler and Zagorc-Koncan 2002			2002	
Arsenic		Arsenic oxide	Daphnia magna	Water Flea				FW	LAB	21	d	IC25					1900	ug/L									Tisler and Zagorc-Koncan 2002			2002	drop in favour of IC10
Arsenic		Arsenic oxide	Brachydanio rerio	Zebrafish						1	d	LC10					27300	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Brachydanio rerio	Zebrafish						2	d	LC10					24500	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Brachydanio rerio	Zebrafish						3	d	LC10					22200	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Brachydanio rerio	Zebrafish						4	d	LC10					21900	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Oncorhynchus mykiss	Rainbow Trout						2	d	LC10					15500	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Oncorhynchus mykiss	Rainbow Trout						3	d	LC10					13400	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Oncorhynchus mykiss	Rainbow Trout						4	d	LC10					12100	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Brachydanio rerio	Zebrafish						1	d	LC50					34900	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Brachydanio rerio	Zebrafish						2	d	LC50					32700	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Brachydanio rerio	Zebrafish						3	d	LC50					28500	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Brachydanio rerio	Zebrafish						4	d	LC50					28100	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Oncorhynchus mykiss	Rainbow Trout						2	d	LC50					23200	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Oncorhynchus mykiss	Rainbow Trout						3	d	LC50					17700	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Oncorhynchus mykiss	Rainbow Trout						4	d	LC50					15300	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Brachydanio rerio	Zebrafish						1	d	LC90					44800	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Brachydanio rerio	Zebrafish						2	d	LC90					43600	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Brachydanio rerio	Zebrafish						3	d	LC90					36700	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Brachydanio rerio	Zebrafish						4	d	LC90					36000	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Oncorhynchus mykiss	Rainbow Trout						2	d	LC90					34700	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Oncorhynchus mykiss	Rainbow Trout						3	d	LC90					23400	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic		Arsenic oxide	Oncorhynchus mykiss	Rainbow Trout						4	d	LC90					19400	ug/L									Tisler and Zagorc-Koncan 2002			2002	test duration
Arsenic	7778430	Arsenic acid (H3AsO4), Disodium salt	Scenedesmus acutus var. acutus	Green Algae	-	S	U	FW	LAB	14	d	EC50	NR	growth	general	T	48	ug/L	7				16	17	mg/L CaCO3	5342	Vocke,R.W., K.L. Sears, J.J. O'Toole, and R.B. Wildman	Growth Responses of Selected Freshwater Algae to Trace Elements and Scrubber Ash Slurry Generated by Coal-Fired Power Plants	Water Res.14(2): 141-150	1980	