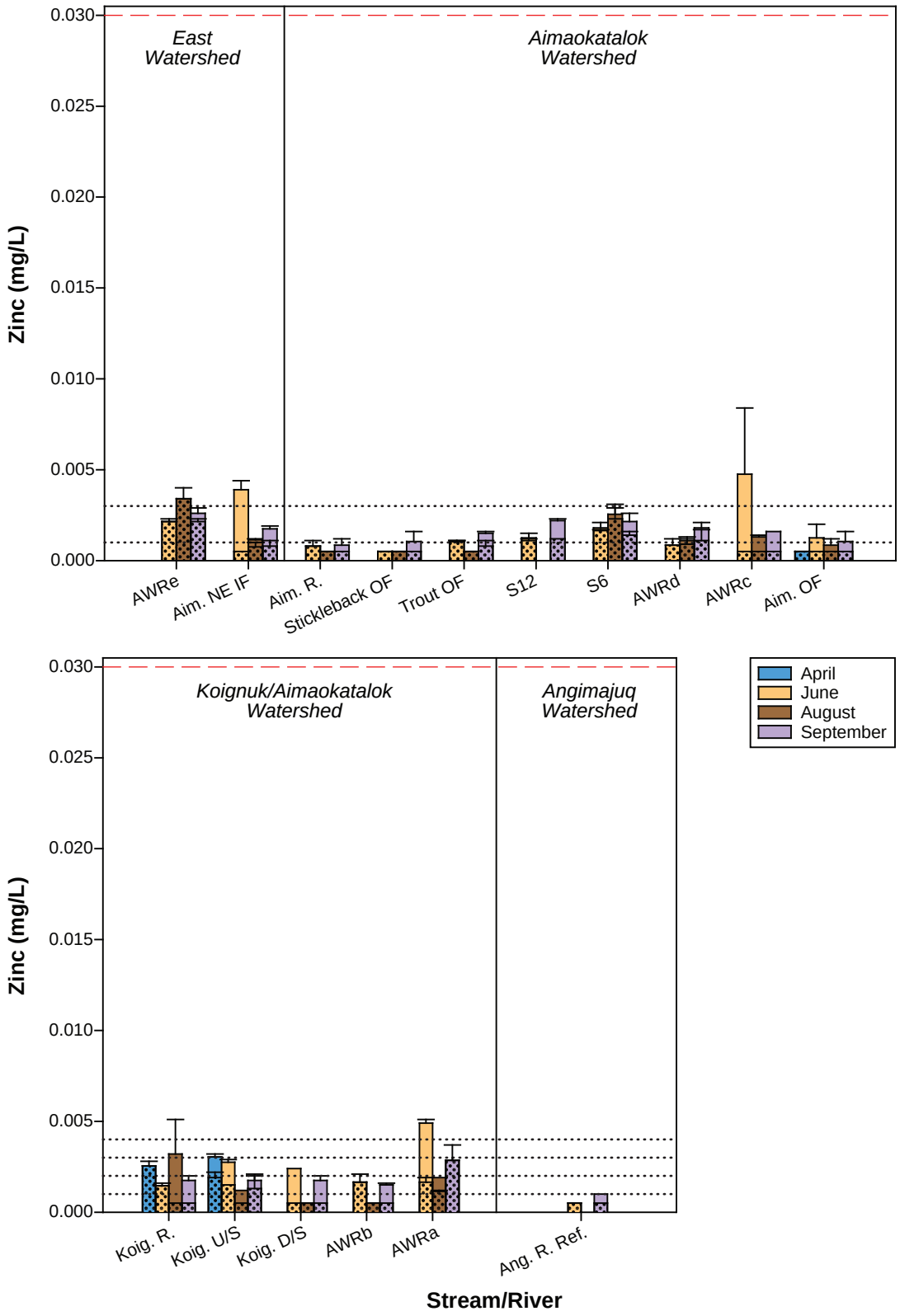

Notes: Error bars represent standard error of the mean of replicates.
Dotted lines represent analytical detection limit (0.001, 0.002, 0.003, or 0.004 mg/L); values below the detection limit are plotted at half the detection limit.
Red dashed line represents CCME guideline (0.03 mg/L).
Solid columns represent total zinc and superimposed dotted columns represent dissolved zinc.

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Zinc Concentration in Streams and Rivers, Hope Bay Belt Project, 2010

Figure 3.3-1y

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Overall, metal concentrations tended to be slightly higher in the Koignuk/Aimaokatalok Watershed than the other watersheds (Figures 3.3-1l to 3.3-1y). One Koignuk/Aimaokatalok site in particular, AWRa, tended to have high metal concentrations compared to other sites (e.g., aluminum, chromium, copper, iron, lead, nickel, and silver). This site generally had higher levels of TSS and turbidity than the other streams, which may account for the higher metal concentrations. Some sites in the Aimaokatalok Watershed also had relatively high concentrations of certain metals: AWRc and S12 had high copper concentrations, AWRd and S6 had high iron concentrations, AWRc had high lead concentrations, and S12 had high molybdenum concentrations.

Within the Koignuk River, several water quality parameters tended to increase downstream, particularly turbidity, TSS, total phosphorus, aluminum, chromium, iron, and lead.

3.3.3 Comparison with CCME Guidelines

Stream and river water quality naturally exceeded several CCME guidelines. Total aluminum and total iron most commonly exceeded CCME guidelines in the surveyed streams and rivers. Table 3.3-1 presents the percentage of stream and river water quality samples in which parameter concentrations were higher than CCME guidelines, and Table 3.3-2 provides the factor by which average 2010 concentrations were higher than CCME guidelines.

Within the East Watershed, the CCME guidelines for total aluminum and total iron were exceeded in all samples collected from Aim. NE IF, and average total aluminum and total iron concentrations at this site were more than 2-fold higher than CCME guidelines for these metals. The hardness-dependent total cadmium guideline was exceeded in a single sample from Aim. NE IF, and the total iron guideline was exceeded in a single sample collected from AWRe. Total chromium concentrations in several samples from both streams exceeded the CCME guideline for hexavalent chromium.

Within the Aimaokatalok Watershed, duplicate samples collected at Stickleback OF during the June freshet were slightly acidic (pH 6.04 and 6.37) and fell below the lower range of the CCME pH guideline of 6.5 to 9.0. Total aluminum and total iron concentrations commonly exceeded CCME guidelines in the streams and rivers within the Aimaokatalok Watershed. At one stream site, S12, all samples collected in 2010 exceeded the total copper guideline. In addition to these common exceedances, there were also some metals that occasionally exceeded guidelines, such as total chromium in a single sample collected from Trout OF, and total copper in a single sample collected from AWRc.

Within the Koignuk/Aimaokatalok Watershed, total aluminum, total chromium, total copper, and total iron commonly exceeded CCME guidelines. Concentrations of these four metals were higher than CCME guidelines in every sample collected from site AWRa. The hardness-dependent cadmium guideline was also exceeded in a low percentage of samples collected from Koig. U/S and AWRa, and the silver guideline was exceeded in a single sample from AWRa. Site AWRa was not only associated with the highest percentage of exceedances, but the factor by which the CCME guideline was exceeded was also highest in this stream (e.g., average total aluminum concentrations at this site exceeded the CCME guideline by 12-fold, compared to a maximum of 7-fold at the other sites).

As seen in nearly all streams and lakes, total aluminum and total iron concentrations were higher than CCME guidelines at the reference river station Ang. R. Ref. The total aluminum guideline was exceeded in all samples, and the total iron guideline was exceeded in several samples from Ang. R. Ref.

Table 3.3-1. Stream and River Water Quality, Percent of Samples in which Concentrations are Higher than CCME Guidelines, Hope Bay Belt Project, 2010

Stream/River	Total Number of Samples Collected	CCME Guideline Value[a]:	pH 6.5-9.0	Ammonia (as N) temperature- and pH-dependent	Nitrate (as N) 2.9 mg/L	Nitrite (as N) 0.06 mg/L	Total Phosphorus Trophic Status[b]	Aluminum (Al)-Total 0.005-0.1[c] mg/L	Arsenic (As)-Total 0.005 mg/L	Cadmium (Cd)-Total 0.000017[d] mg/L	Chromium (Cr)-Total 0.001[e] mg/L	Copper (Cu)-Total 0.002-0.004[f] mg/L
East												
AWRe	6		-	-	-	-	Oligotrophic to Mesotrophic	-	-	-	33.3	-
Aim. NE lF	6		-	-	-	-	Meso-eutrophic to Eutrophic	100	-	16.7	66.7	-
Aimaokatalok												
Aim. R.	5		-	-	-	-	Oligotrophic to Mesotrophic	-	-	-	-	-
Stickleback OF	6		33.3	-	-	-	Oligotrophic to Mesotrophic	33.3	-	-	-	-
Trout OF	6		-	-	-	-	Mesotrophic	33.3	-	-	16.7	-
S12	4		-	-	-	-	Oligotrophic	-	-	-	-	100
S6	6		-	-	-	-	Ultra-oligotrophic	16.7	-	-	-	-
AWRd	6		-	-	-	-	Mesotrophic to Meso-eutrophic	-	-	-	-	-
AWRc	6		-	-	-	-	Oligotrophic to Mesotrophic	-	-	-	-	16.7
Aim. OF	7		-	-	-	-	Oligotrophic to Mesotrophic	14.3	-	-	-	-
Koignuk/Aimaokatalok												
Koig. R.	8		-	-	-	-	Oligotrophic to Mesotrophic	25	-	-	-	-
Koig. U/S	8		-	-	-	-	Mesotrophic to Meso-eutrophic	100	-	25	50	75
Koig. D/S	6		-	-	-	-	Mesotrophic to Eutrophic	100	-	-	66.7	33.3
AWRb	6		-	-	-	-	Mesotrophic	100	-	-	33.3	-
AWRa	6		-	-	-	-	Meso-eutrophic to Eutrophic	100	-	16.7	100	100
Angimajuq												
Ang. R. Ref	4		-	-	-	-	Mesotrophic	100	-	-	-	-

All values represent percentages of 2010 samples that are both higher than the CCME guidelines and above analytical detection limits. *(continued)*

a) Canadian water quality guidelines for the protection of aquatic life (CCME 2007)

b) <0.004 mg/L = ultra-oligotrophic; 0.004 - 0.010 mg/L = oligotrophic; 0.01 - 0.02 mg/L = mesotrophic; 0.02 - 0.035 mg/L = meso-eutrophic; 0.035 - 0.1 mg/L = eutrophic; >0.1 mg/L = hyper-eutrophic

c) 0.005 mg/L at pH <6.5; 0.1 mg/L a pH ≥6.5

d) The equation for correcting this guideline for hardness is: $10^{[0.86[\log(\text{hardness})]-3.2]} / 1000$

e) Guideline concentration for hexavalent chromium. No concentrations were higher than the CCME guideline for trivalent chromium (0.0089 mg/L).

f) 0.002 mg/L at water hardness of 0-120 mg/L (as $CaCO_3$); 0.003 mg/L at water hardness of 120-180 mg/L (as $CaCO_3$); 0.004 mg/L at water hardness of > 180 mg/L (as $CaCO_3$)

g) 0.001 mg/L at water hardness of 0-60 mg/L (as $CaCO_3$); 0.002 mg/L at water hardness of 60-120 mg/L (as $CaCO_3$); 0.004 mg/L at water hardness of 120-180 mg/L (as $CaCO_3$); 0.007 mg/L at water hardness of > 180 mg/L (as $CaCO_3$)

h Guideline concentration for inorganic mercury

i) 0.025 mg/L at water hardness of 0-60 mg/L (as $CaCO_3$); 0.065 mg/L at water hardness of 60-120 mg/L (as $CaCO_3$); 0.110 mg/L at water hardness of 120-180 mg/L (as $CaCO_3$); 0.150 mg/L at water hardness of > 180 mg/L (as $CaCO_3$)

Table 3.3-1. Stream and River Water Quality, Percent of Samples in which Concentrations are Higher than CCME Guidelines, Hope Bay Belt Project, 2010 (completed)

Stream/River	Total Number of Samples Collected	CCME Guideline Value[a]:	Iron (Fe)-Total 0.3 mg/L	Lead (Pb)-Total 0.001-0.007[g] mg/L	Mercury (Hg)-Total 0.000026[h] mg/L	Molybdenum (Mo)-Total 0.073 mg/L	Nickel (Ni)-Total 0.025-0.150[i] mg/L	Selenium (Se)-Total 0.001 mg/L	Silver (Ag)-Total 0.0001 mg/L	Thallium (Tl)-Total 0.0008 mg/L	Zinc (Zn)-Total 0.03 mg/L
East											
AWRe	6		16.7	-	-	-	-	-	-	-	-
Aim. NE IF	6		100	-	-	-	-	-	-	-	-
Aimaokatalok											
Aim. R.	5		-	-	-	-	-	-	-	-	-
Stickleback OF	6		33.3	-	-	-	-	-	-	-	-
Trout OF	6		66.7	-	-	-	-	-	-	-	-
S12	4		50	-	-	-	-	-	-	-	-
S6	6		50	-	-	-	-	-	-	-	-
AWRd	6		66.7	-	-	-	-	-	-	-	-
AWRc	6		66.7	-	-	-	-	-	-	-	-
Aim. OF	7		-	-	-	-	-	-	-	-	-
Koignuk/Aimaokatalok											
Koig. R.	8		12.5	-	-	-	-	-	-	-	-
Koig. U/S	8		75	-	-	-	-	-	-	-	-
Koig. D/S	6		100	-	-	-	-	-	-	-	-
AWRb	6		100	-	-	-	-	-	-	-	-
AWRa	6		100	-	-	-	-	-	16.7	-	-
Angimajuq											
Ang. R. Ref	4		50	-	-	-	-	-	-	-	-

All values represent percentages of 2010 samples that are both higher than the CCME guidelines and above analytical detection limits.

a) Canadian water quality guidelines for the protection of aquatic life (CCME 2007)

b) <0.004 mg/L = ultra-oligotrophic; 0.004 - 0.010 mg/L = oligotrophic; 0.01 - 0.02 mg/L = mesotrophic; 0.02 - 0.035 mg/L = meso-eutrophic; 0.035 - 0.1 mg/L = eutrophic; >0.1 mg/L = hyper-eutrophic

c) 0.005 mg/L at pH <6.5; 0.1 mg/L a pH ≥6.5

d) The equation for correcting this guideline for hardness is: $10^{[0.86[\log(\text{hardness})]-3.2]} / 1000$

e) Guideline concentration for hexavalent chromium. No concentrations were higher than the CCME guideline for trivalent chromium (0.0089 mg/L).

f) 0.002 mg/L at water hardness of 0-120 mg/L (as $CaCO_3$); 0.003 mg/L at water hardness of 120-180 mg/L (as $CaCO_3$); 0.004 mg/L at water hardness of > 180 mg/L (as $CaCO_3$)

g) 0.001 mg/L at water hardness of 0-60 mg/L (as $CaCO_3$); 0.002 mg/L at water hardness of 60-120 mg/L (as CaCO3); 0.004 mg/L at water hardness of 120-180 mg/L (as $CaCO_3$); 0.007 mg/L at water hardness of > 180 mg/L (as $CaCO_3$)

h Guideline concentration for inorganic mercury

i) 0.025 mg/L at water hardness of 0-60 mg/L (as $CaCO_3$); 0.065 mg/L at water hardness of 60-120 mg/L (as $CaCO_3$); 0.110 mg/L at water hardness of 120-180 mg/L (as $CaCO_3$); 0.150 mg/L at water hardness of > 180 mg/L (as $CaCO_3$)

Table 3.3-2. Stream and River Water Quality, Factor by which Average Concentrations are Higher than CCME Guidelines, Hope Bay Belt Project, 2010

Stream/River	Total Number of Samples Collected	CCME Guideline Value[a]:	pH 6.5-9.0	Ammonia (as N) temperature- and pH-dependent	Nitrate (as N) 2.9 mg/L	Nitrite (as N) 0.06 mg/L	Total Phosphorus Trophic Status[b]	Aluminum (Al)-Total 0.005-0.1[c] mg/L	Arsenic (As)-Total 0.005 mg/L	Cadmium (Cd)-Total 0.000017[d] mg/L	Chromium (Cr)-Total 0.001[e] mg/L	Copper (Cu)-Total 0.002-0.004[f] mg/L
East												
AWRe	6		-	-	-	-	Oligotrophic to Mesotrophic	-	-	-	-	-
Aim. NE lF	6		-	-	-	-	Meso-eutrophic to Eutrophic	2.80	-	-	-	-
Aimaokatalok												
Aim. R.	5		-	-	-	-	Oligotrophic to Mesotrophic	-	-	-	-	-
Stickleback OF	6		-	-	-	-	Oligotrophic to Mesotrophic	-	-	-	-	-
Trout OF	6		-	-	-	-	Mesotrophic	1.62	-	-	-	-
S12	4		-	-	-	-	Oligotrophic	-	-	-	-	2.00
S6	6		-	-	-	-	Ultra-oligotrophic	-	-	-	-	-
AWRd	6		-	-	-	-	Mesotrophic to Meso-eutrophic	-	-	-	-	-
AWRc	6		-	-	-	-	Oligotrophic to Mesotrophic	-	-	-	-	1.49
Aim. OF	7		-	-	-	-	Oligotrophic to Mesotrophic	-	-	-	-	-
Koignuk/Aimaokatalok												
Koig. R.	8		-	-	-	-	Oligotrophic to Mesotrophic	-	-	-	-	-
Koig. U/S	8		-	-	-	-	Mesotrophic to Meso-eutrophic	3.65	-	-	1.01	1.15
Koig. D/S	6		-	-	-	-	Mesotrophic to Eutrophic	7.16	-	-	1.70	1.00
AWRb	6		-	-	-	-	Mesotrophic	2.31	-	-	-	-
AWRa	6		-	-	-	-	Meso-eutrophic to Eutrophic	12.05	-	-	2.70	1.50
Angimajuq												
Ang. R. Ref	4		-	-	-	-	Mesotrophic	2.46	-	-	-	-

All values represent the factor by which stream/river averages are higher than CCME guidelines (using the average concentration of each parameter within a stream/river site across various seasons). *(continued)*

Even though a percentage of samples may be higher than a guideline amount, the calculated lake average may not be higher than CCME guidelines

Dashes represent averages that are not higher than guidelines

a) Canadian water quality guidelines for the protection of aquatic life (CCME 2007)

b) <0.004 mg/L = ultra-oligotrophic; 0.004 - 0.010 mg/L = oligotrophic; 0.01 - 0.02 mg/L = mesotrophic; 0.02 - 0.035 mg/L = meso-eutrophic; 0.035 - 0.1 mg/L = eutrophic; >0.1 mg/L = hyper-eutrophic

c) 0.005 mg/L at pH <6.5; 0.1 mg/L a pH ≥6.5

d) The equation for correcting this guideline for hardness is: $10^{[0.86[\log(\text{hardness})]-3.2]} / 1000$

e) Guideline concentration for hexavalent chromium. No concentrations were higher than the CCME guideline for trivalent chromium (0.0089 mg/L).

f) 0.002 mg/L at water hardness of 0-120 mg/L (as $CaCO_3$*); 0.003 mg/L at water hardness of 120-180 mg/L (as* $CaCO_3$*); 0.004 mg/L at water hardness of > 180 mg/L (as* $CaCO_3$*)*

g) 0.001 mg/L at water hardness of 0-60 mg/L (as $CaCO_3$*); 0.002 mg/L at water hardness of 60-120 mg/L (as* $CaCO_3$*); 0.004 mg/L at water hardness of 120-180 mg/L (as* $CaCO_3$*); 0.007 mg/L at water hardness of > 180 mg/L (as* $CaCO_3$*)*

h) Guideline concentration for inorganic mercury

i) 0.025 mg/L at water hardness of 0-60 mg/L (as $CaCO_3$*); 0.065 mg/L at water hardness of 60-120 mg/L (as* $CaCO_3$*); 0.110 mg/L at water hardness of 120-180 mg/L (as* $CaCO_3$*); 0.150 mg/L at water hardness of > 180 mg/L (as* $CaCO_3$*)*

Table 3.3-2. Stream and River Water Quality, Factor by which Average Concentrations are Higher than CCME Guidelines, Hope Bay Belt Project, 2010 (completed)

Stream/River	Total Number of Samples Collected	CCME Guideline Value[a]:	Iron (Fe)-Total 0.3 mg/L	Lead (Pb)-Total 0.001-0.007[g] mg/L	Mercury (Hg)-Total 0.000026[h] mg/L	Molybdenum (Mo)-Total 0.073 mg/L	Nickel (Ni)-Total 0.025-0.150[i] mg/L	Selenium (Se)-Total 0.001 mg/L	Silver (Ag)-Total 0.0001 mg/L	Thallium (Tl)-Total 0.0008 mg/L	Zinc (Zn)-Total 0.03 mg/L
East											
AWRe	6		-	-	-	-	-	-	-	-	-
Aim. NE IF	6		2.45	-	-	-	-	-	-	-	-
Aimaokatalok											
Aim. R.	5		-	-	-	-	-	-	-	-	-
Stickleback OF	6		-	-	-	-	-	-	-	-	-
Trout OF	6		1.11	-	-	-	-	-	-	-	-
S12	4		-	-	-	-	-	-	-	-	-
S6	6		2.04	-	-	-	-	-	-	-	-
AWRd	6		4.59	-	-	-	-	-	-	-	-
AWRc	6		1.43	-	-	-	-	-	-	-	-
Aim. OF	7		-	-	-	-	-	-	-	-	-
Koignuk/Aimaokatalok											
Koig. R.	8		-	-	-	-	-	-	-	-	-
Koig. U/S	8		1.40	-	-	-	-	-	-	-	-
Koig. D/S	6		2.49	-	-	-	-	-	-	-	-
AWRb	6		1.52	-	-	-	-	-	-	-	-
AWRa	6		4.80	-	-	-	-	-	-	-	-
Angimajuq											
Ang. R. Ref	4		1.16	-	-	-	-	-	-	-	-

All values represent the factor by which stream/river averages are higher than CCME guidelines (using the average concentration of each parameter within a stream/river site across various seasons).

Even though a percentage of samples may be higher than a guideline amount, the calculated lake average may not be higher than CCME guidelines

Dashes represent averages that are not higher than guidelines

a) Canadian water quality guidelines for the protection of aquatic life (CCME 2007)

b) <0.004 mg/L = ultra-oligotrophic; 0.004 - 0.010 mg/L = oligotrophic; 0.01 - 0.02 mg/L = mesotrophic; 0.02 - 0.035 mg/L = meso-eutrophic; 0.035 - 0.1 mg/L = eutrophic; >0.1 mg/L = hyper-eutrophic

c) 0.005 mg/L at pH <6.5; 0.1 mg/L a pH ≥6.5

d) The equation for correcting this guideline for hardness is: $10^{[0.86[\log(\text{hardness})]-3.2]}$ / 1000

e) Guideline concentration for hexavalent chromium. No concentrations were higher than the CCME guideline for trivalent chromium (0.0089 mg/L).

f) 0.002 mg/L at water hardness of 0-120 mg/L (as $CaCO_3$); 0.003 mg/L at water hardness of 120-180 mg/L (as $CaCO_3$); 0.004 mg/L at water hardness of > 180 mg/L (as $CaCO_3$)

g) 0.001 mg/L at water hardness of 0-60 mg/L (as $CaCO_3$); 0.002 mg/L at water hardness of 60-120 mg/L (as $CaCO_3$); 0.004 mg/L at water hardness of 120-180 mg/L (as $CaCO_3$); 0.007 mg/L at water hardness of > 180 mg/L (as $CaCO_3$)

h) Guideline concentration for inorganic mercury

i) 0.025 mg/L at water hardness of 0-60 mg/L (as $CaCO_3$); 0.065 mg/L at water hardness of 60-120 mg/L (as $CaCO_3$); 0.110 mg/L at water hardness of 120-180 mg/L (as $CaCO_3$); 0.150 mg/L at water hardness of > 180 mg/L (as $CaCO_3$)

3.3.4 Quality Assurance/Quality Control

Field and travel blanks from streams were pooled with lake blanks, and are discussed in the lake water quality section. Raw data are provided in Appendix 3.2-2.

3.3.5 Annual Variation

Only historical sampling locations that were also sampled in 2010 were included in the comparison of annual water quality data shown in Figures 3.3-2a to 3.3-2y. Note that historical sampling locations may not correspond exactly with those sampled in 2010, and this, in addition to methodological differences, may contribute to variability observed among years (see Table 2.14-2 and Figures 2.14-1a to 2.14-1c for historical sampling methodologies and locations). Differences in the timing of sample collection can also affect annual averages for many parameters. Under-ice or freshet water samples can sometimes contain higher metal and nutrient concentrations than those collected in the summer. Comparisons between years are further complicated by differences in analytical detection limits.

Some general trends were apparent in the historical dataset (Figures 3.3-2a to 3.3-2y). Hardness levels and TDS concentrations tended to be highest in Stickleback OF (Figures 3.3-2b and 3.3-2e). As observed in the 2010 data, historical concentrations of total aluminum and total iron frequently exceeded CCME guidelines in streams and rivers (Figures 3.3-2l and 3.3-2q).

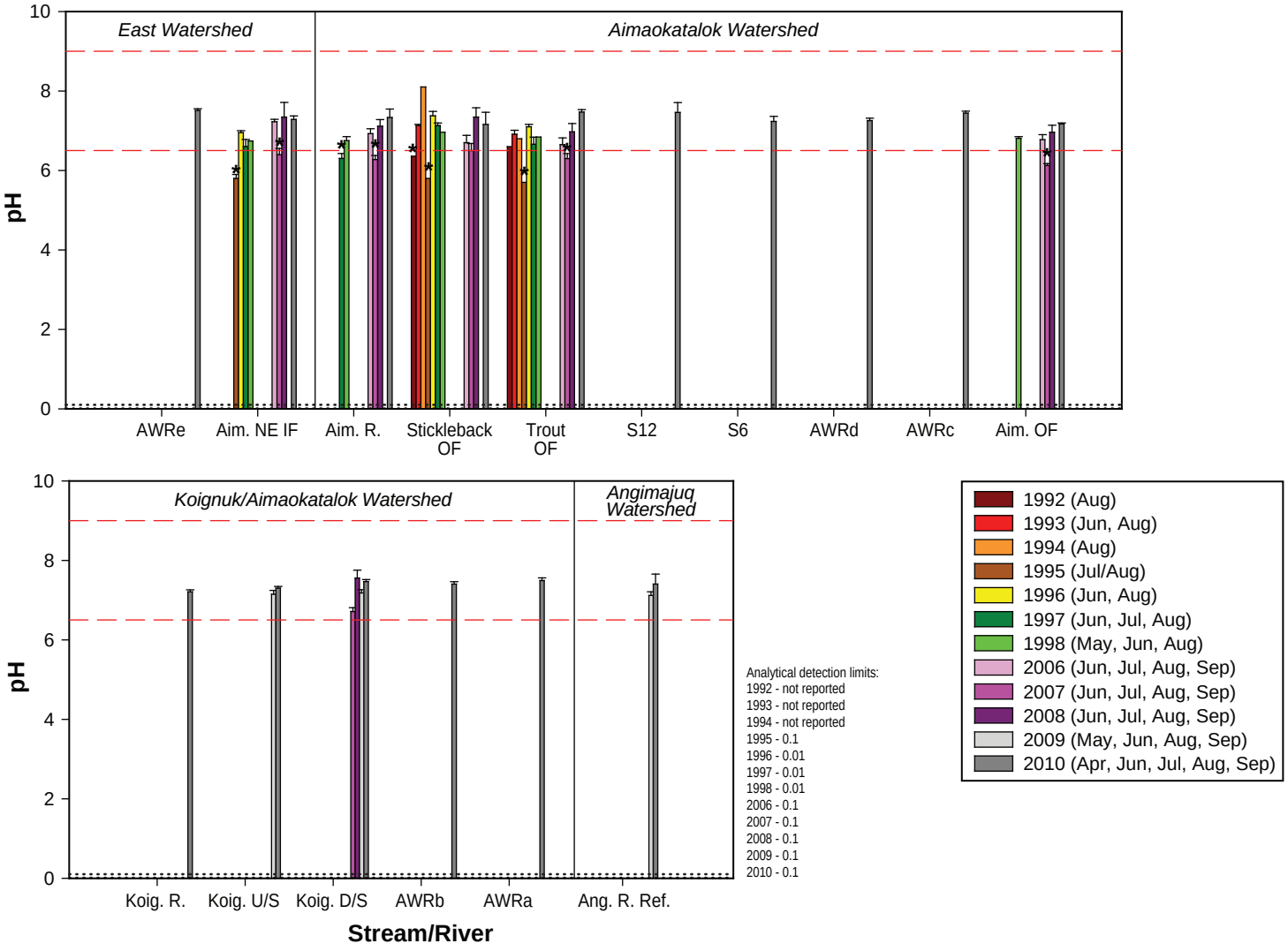
3.4 LAKE SEDIMENT QUALITY

Lake sediment samples were collected from a total of 12 sites in 6 lakes during August 2010 (see Table 2.1-4 for locations and dates of sample collection). All sediment samples collected were compared to CCME sediment quality guidelines for the protection of aquatic life: the interim sediment quality guidelines (ISQGs) and the probable effects levels (PELs; CCME 2002). The more conservative ISQGs are levels below which adverse biological effects are rarely observed, whereas the higher PELs correspond to concentrations above which negative effects frequently occur. Lake sediment descriptions and photographs can be found in Appendices 3.4-1 and 3.4-2. All lake sediment quality analytical data for 2010 are provided in Appendix 3.4-3. Historical sediment quality data are also available for some lakes in the area (Figures 2.14-2a to 2.14-2c; Table 2.14-3).

3.4.1 Depth Variation

Figure 3.4-1 presents lake sediment particle size composition. Lake sediments were largely composed of clay and silt, with lesser amounts of sand and very little gravel. In the shallow depth zone, sand made up 75% of the average sediment composition at Windy Lake, and 38 to 56% of the average sediment composition at Aimaokalatok stations 2, 12, 5, 11. In the remaining shallow sites, fine particles (clay and silt) made up at least 85% of the sediments. At depths greater than 5 m, fine sediments accounted for at least 90% of the particle size composition (Figure 3.4-1).

Figures 3.4-2a to 3.4-2k present 2010 lake sediment quality results. Windy and Aimaokatalok lakes were the only lakes at which samples were collected from both the shallow depth zone (<5 m depth) and the mid- to deep depth zones (> 5 m). In these lakes, many sediment parameter concentrations were higher in the mid- to deep depth zones than in the shallow depth zone, likely due to the increase in fine sediments with depth. Parameters that increased in concentration with depth included: available phosphate (Figure 3.4-2b), cadmium (Figure 3.4-2f), chromium (Figure 3.4-2g), mercury (Figure 3.4-2j), and zinc (Figure 3.4-2k). This trend was most apparent for Windy Lake, as concentrations of all analyzed parameters were higher in the deep samples than in the shallow samples.



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit.
Red dashed lines represent CCME guideline (pH 6.5–9).
** Indicates average values that are not within CCME guideline pH range.*

Figure 3.3-2a

NEWMONT NORTH AMERICA

Average Annual pH in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2a

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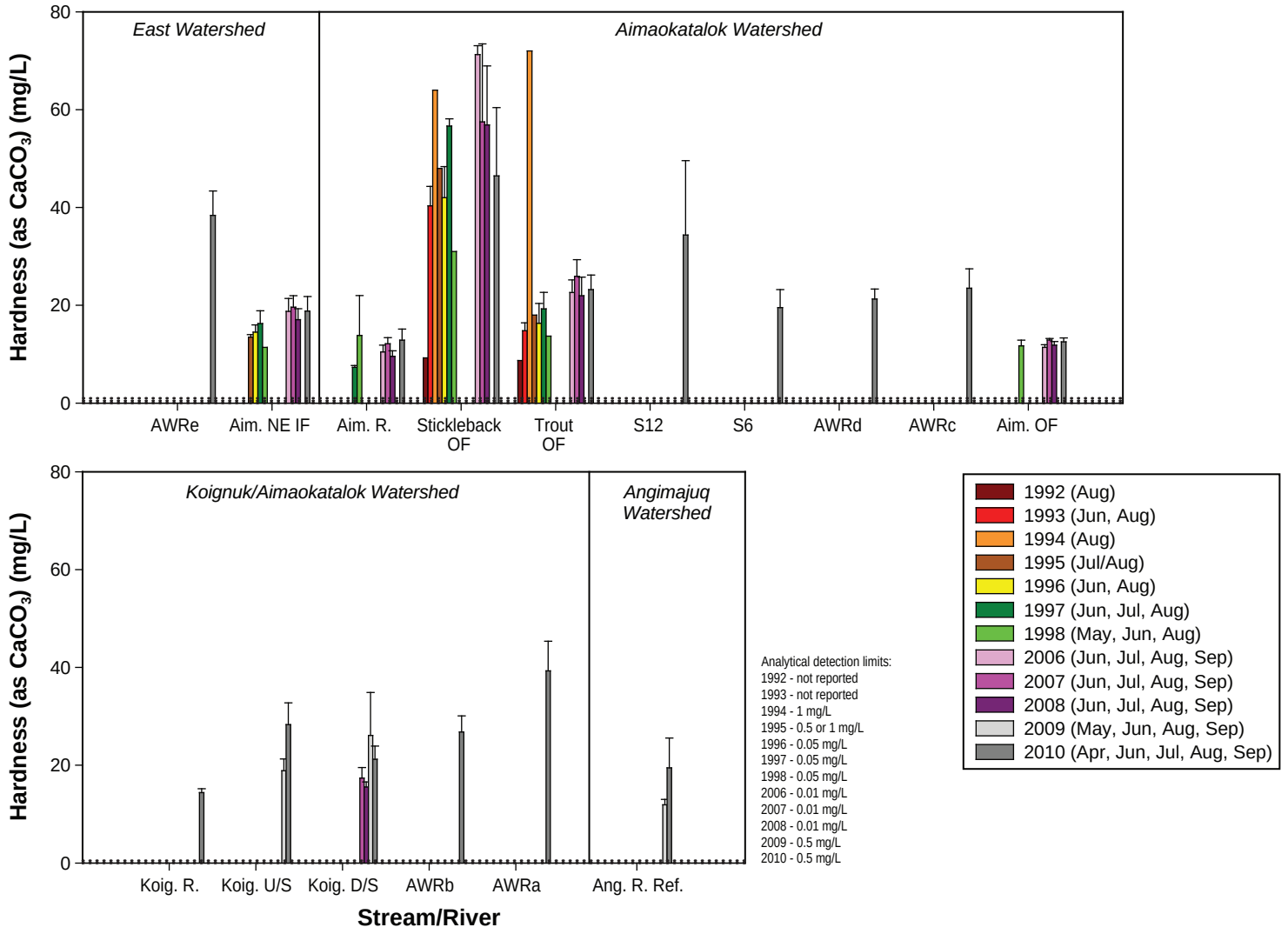

Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit.
There is no CCME guideline for hardness.

Figure 3.3-2b

NEWMONT NORTH AMERICA

Average Annual Hardness in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2b

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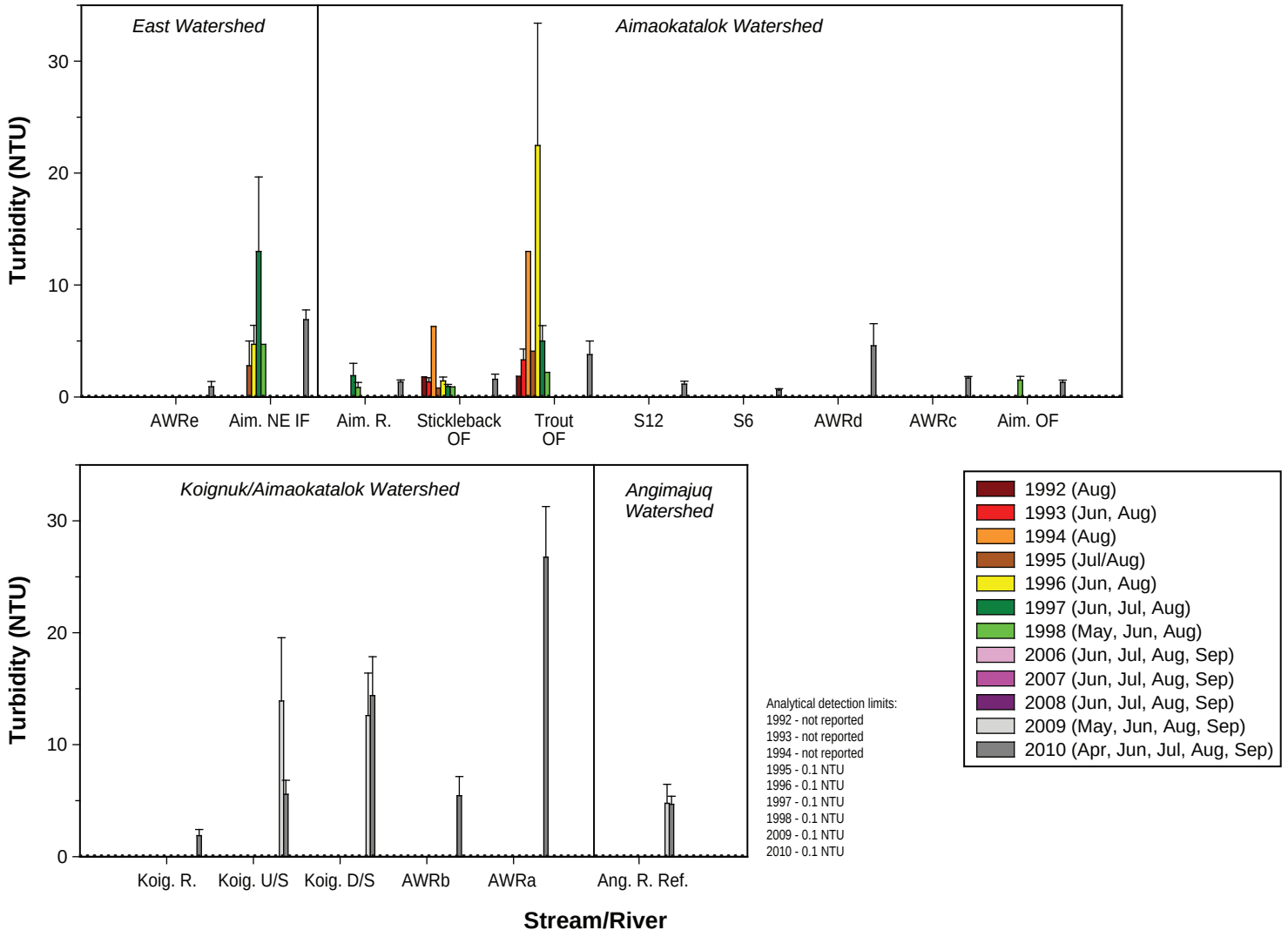


Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit.
CCME guideline for turbidity is dependent upon background levels.

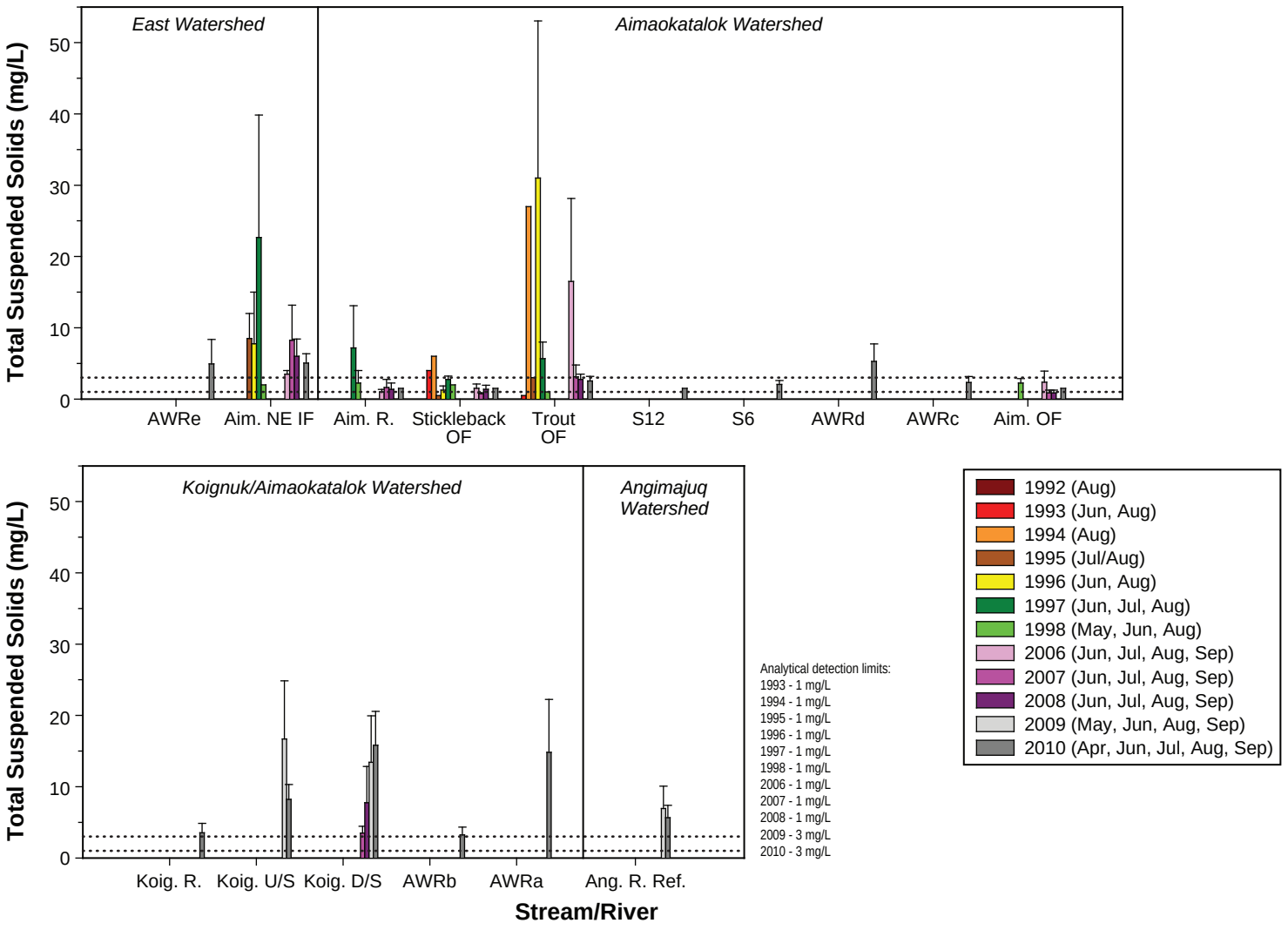
Figure 3.3-2c

NEWMONT NORTH AMERICA

Average Annual Turbidity in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2c

Rescan Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below the detection limit are plotted at half the detection limit.
CCME guideline for total suspended solids is dependent upon background levels.

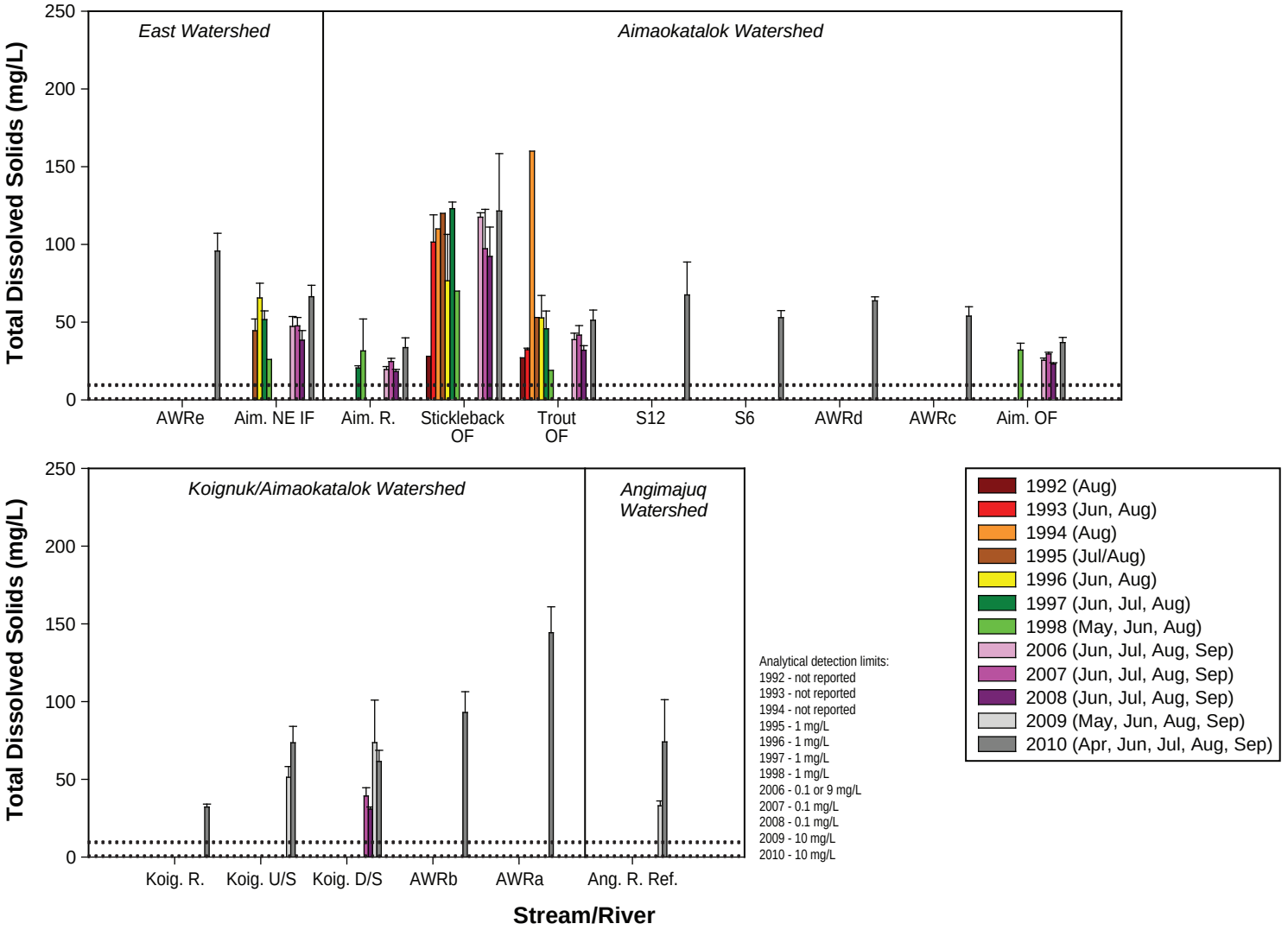
Figure 3.3-2d

NEWMONT NORTH AMERICA

Average Annual Total Suspended Solids Concentration in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2d

Rescan™ Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below the detection limit are plotted at half the detection limit.
There is no CCME guideline for total dissolved solids.

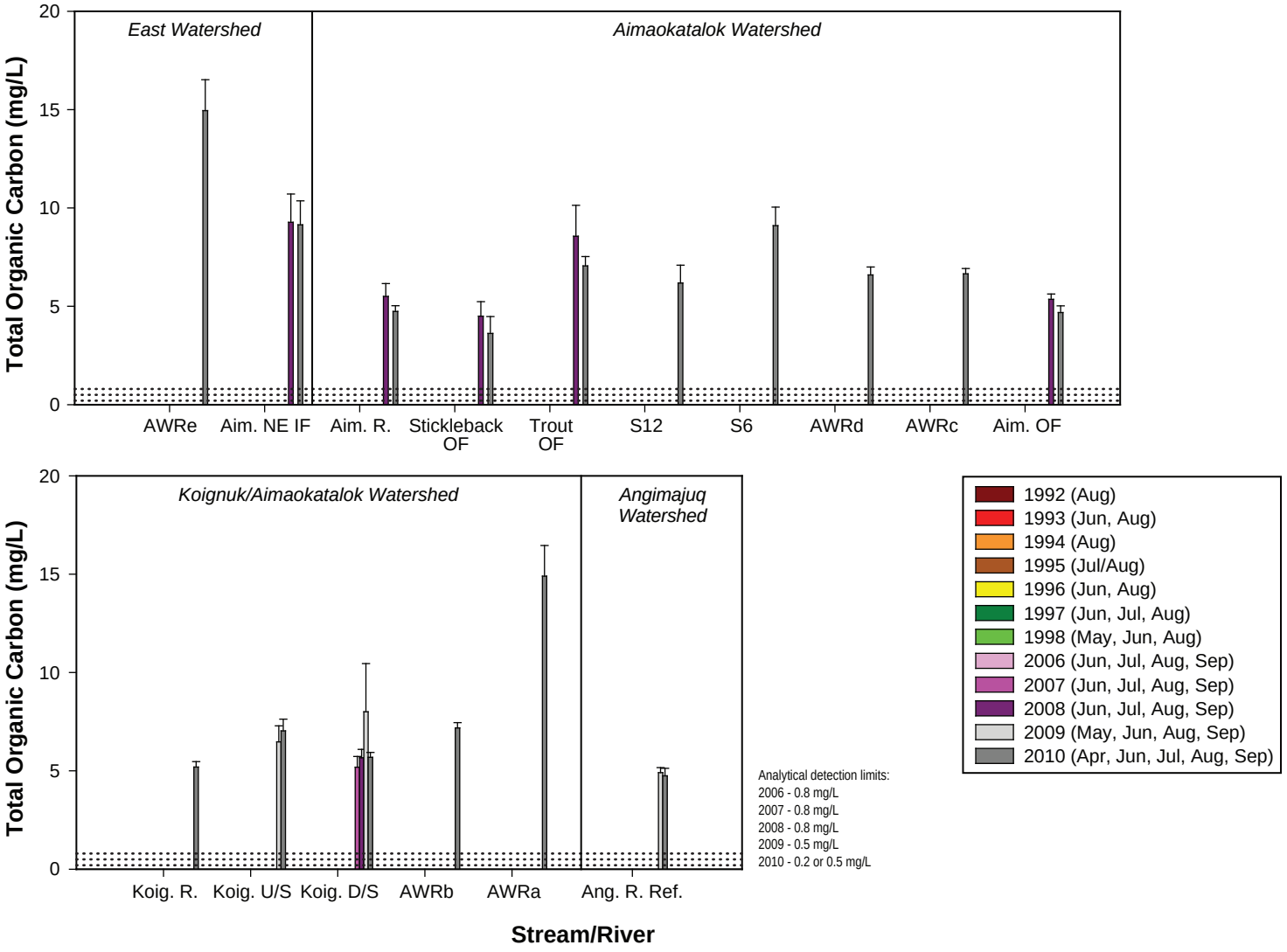
Figure 3.3-2e

NEWMONT NORTH AMERICA

Average Annual Total Dissolved Solids Concentration in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2e

Rescan Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below the detection limit are plotted at half the detection limit.
There is no CCME guideline for total organic carbon.

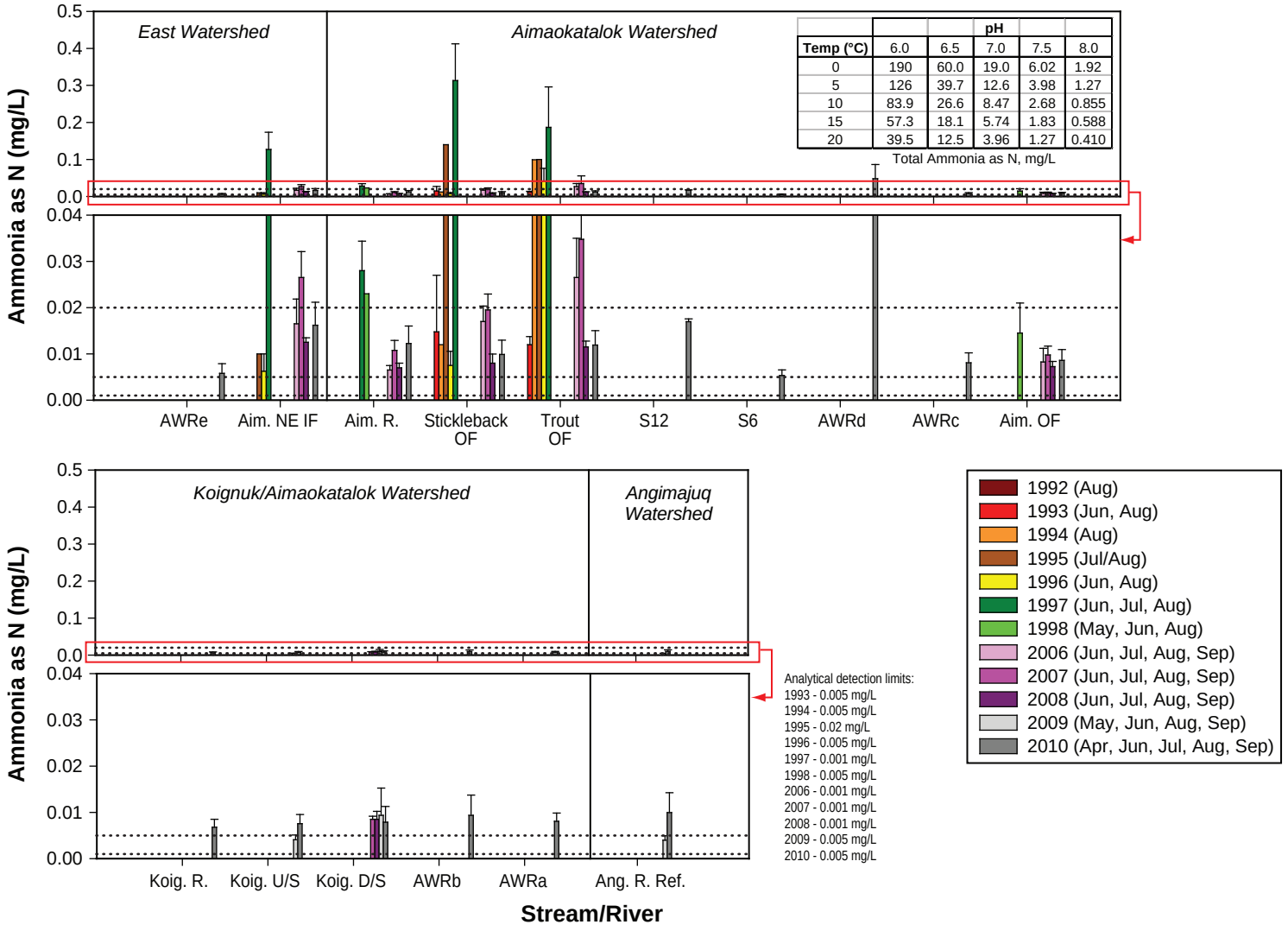
Figure 3.3-2f

NEWMONT NORTH AMERICA

Average Annual Total Organic Carbon Concentration in Streams and Rivers, Hope Bay Belt Project, 1992–2010

Figure 3.3-2f

Rescan Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below the detection limit are plotted at half the detection limit.
Inset table shows temperature- and pH-dependent CCME guideline.
** Indicates average ammonia concentrations that are both above the detection limit and higher than the CCME guideline.*

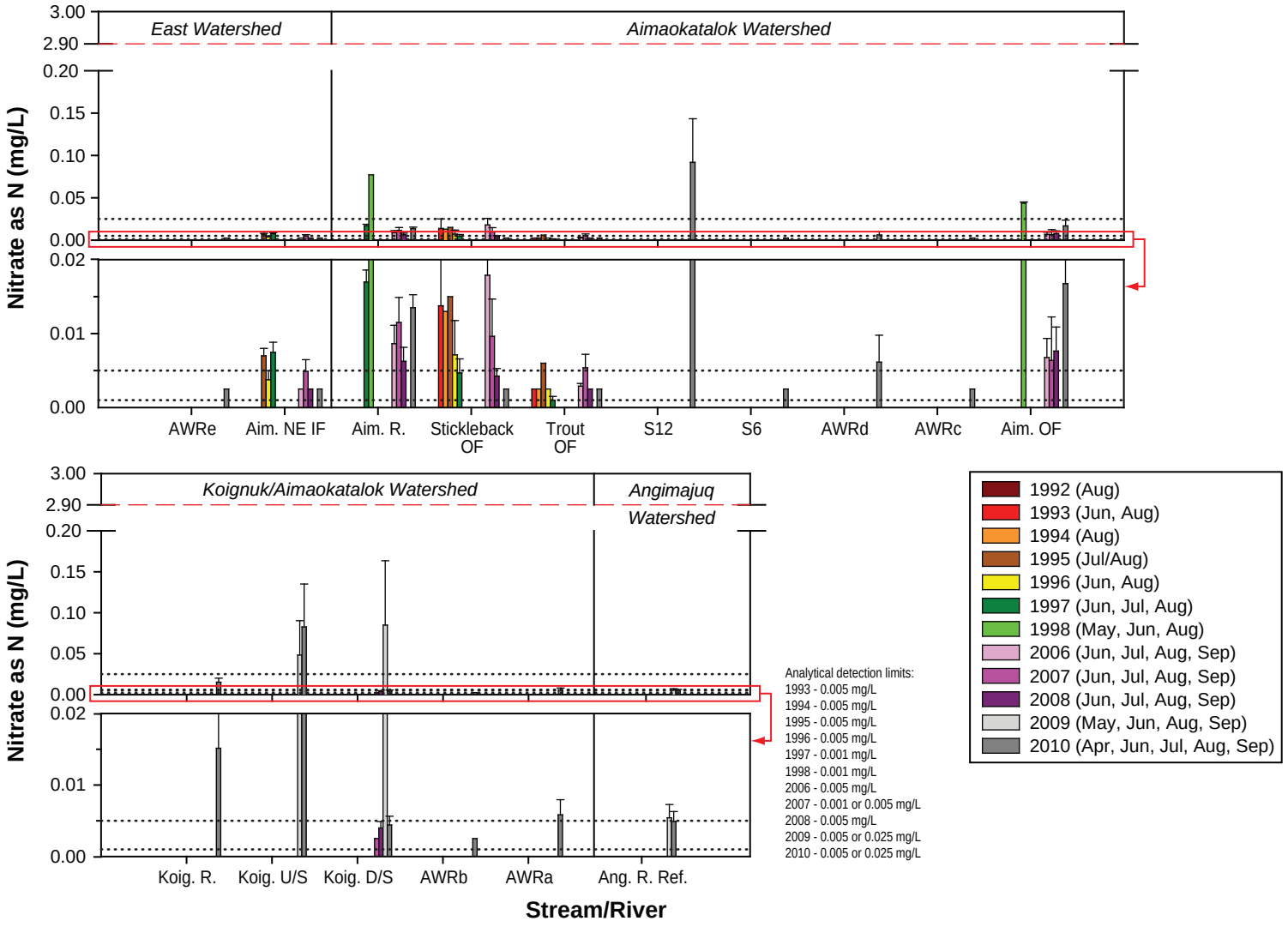
Figure 3.3-2g

NEWMONT NORTH AMERICA

Average Annual Ammonia Concentration in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2g

Rescan™ Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below the detection limit are plotted at half the detection limit.
Red dashed line represents CCME guideline (2.9 mg/L).
** Indicates average nitrate concentrations that are both above the detection limit and higher than the CCME guideline.*

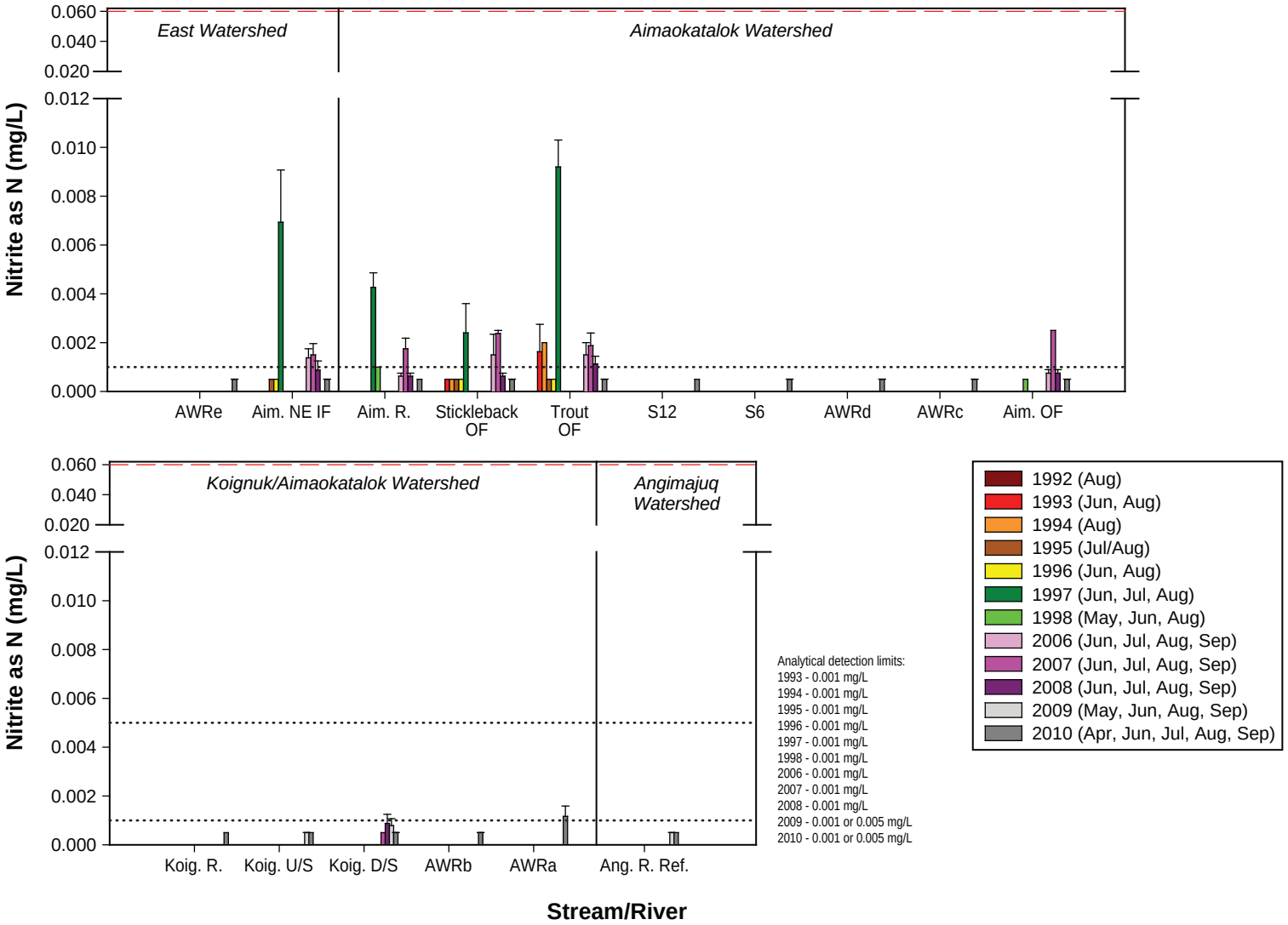
Figure 3.3-2h

NEWMONT NORTH AMERICA

Average Annual Nitrate Concentration in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2h

Rescan Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below the detection limit are plotted at half the detection limit.
Red dashed line represents CCME guideline (0.06 mg/L).
** Indicates average nitrite concentrations that are both above the detection limit and higher than the CCME guideline.*

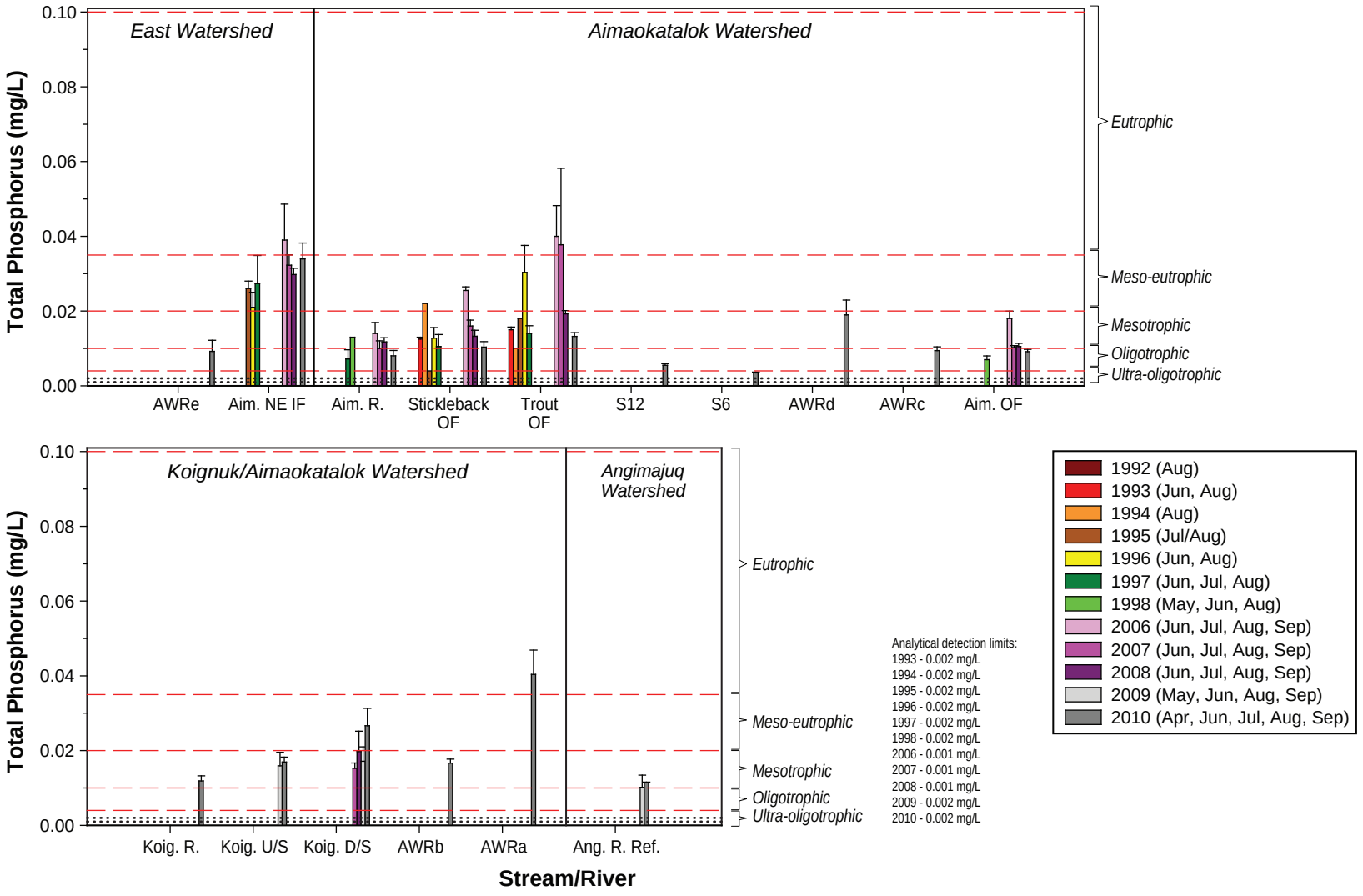
Figure 3.3-2i

NEWMONT NORTH AMERICA

Average Annual Nitrite Concentration in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2i

Rescan™ Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below the detection limit are plotted at half the detection limit.
Red dashed lines represents CCME trigger ranges (<0.004 mg/L = ultraoligotrophic; 0.004–0.010 mg/L = oligotrophic; 0.01–0.02 mg/L = mesotrophic; 0.02–0.035 mg/L = meso-eutrophic; 0.035–0.1 mg/L = eutrophic; >0.1 mg/L = hyper-eutrophic).

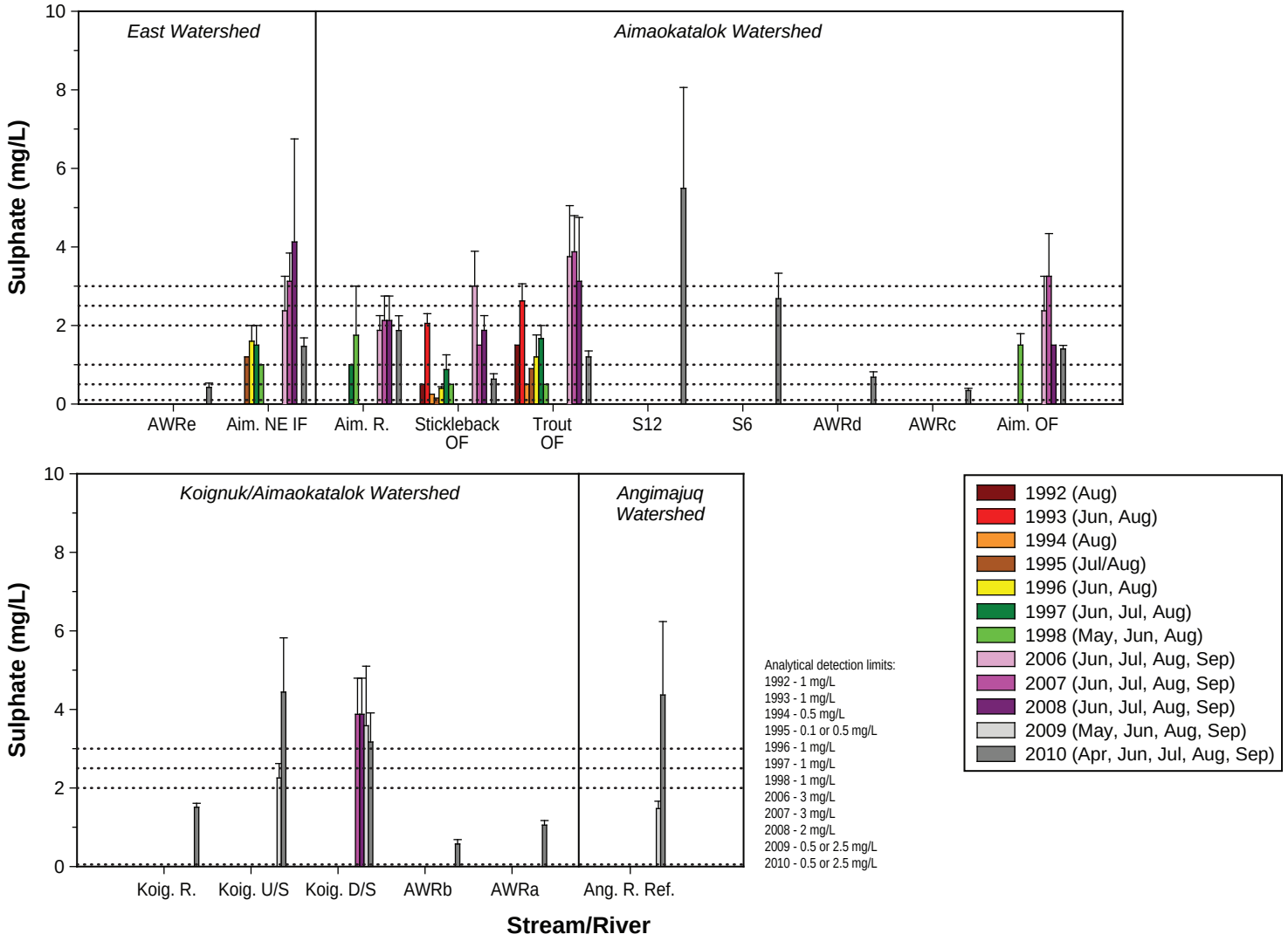
Figure 3.3-2j

NEWMONT NORTH AMERICA

Average Annual Total Phosphorus Concentration in Streams and Rivers, Hope Bay Belt Project, 1992–2010

Figure 3.3-2j

Rescan Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below the detection limit are plotted at half the detection limit.
There is no CCME guideline for sulphate.

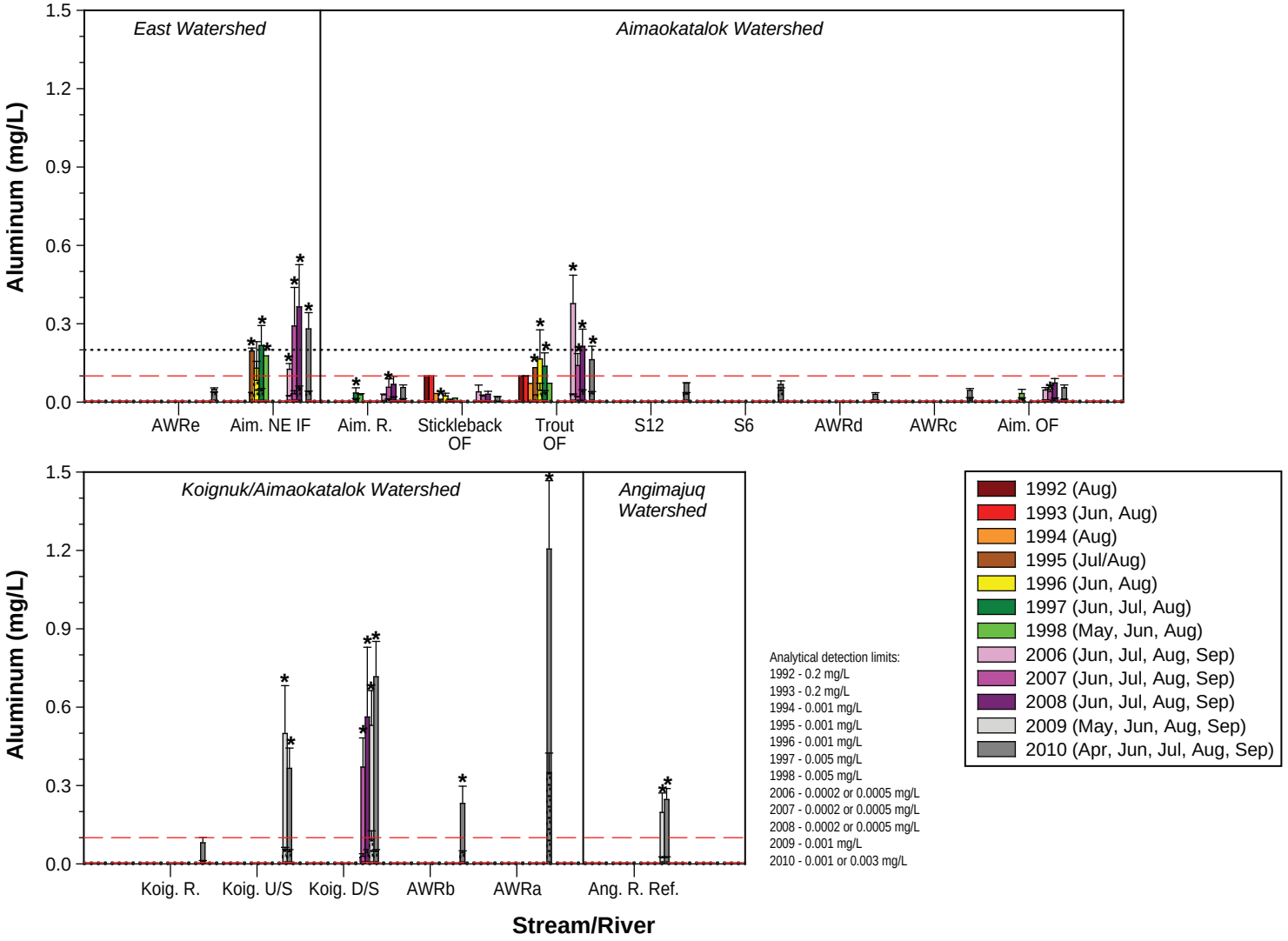
Figure 3.3-2k

NEWMONT NORTH AMERICA

Average Annual Sulphate Concentration in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2k

Rescan Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below the detection limit are plotted at half the detection limit.
Red dashed lines represent pH-dependent CCME guideline (0.005 mg/L at pH less than 6.5; 0.1 mg/L at pH greater than or equal to 6.5).
Solid columns represent total aluminum and superimposed dotted columns represent dissolved aluminum.
** Indicates average total aluminum concentrations that are both above the detection limit and higher than the CCME guideline.*

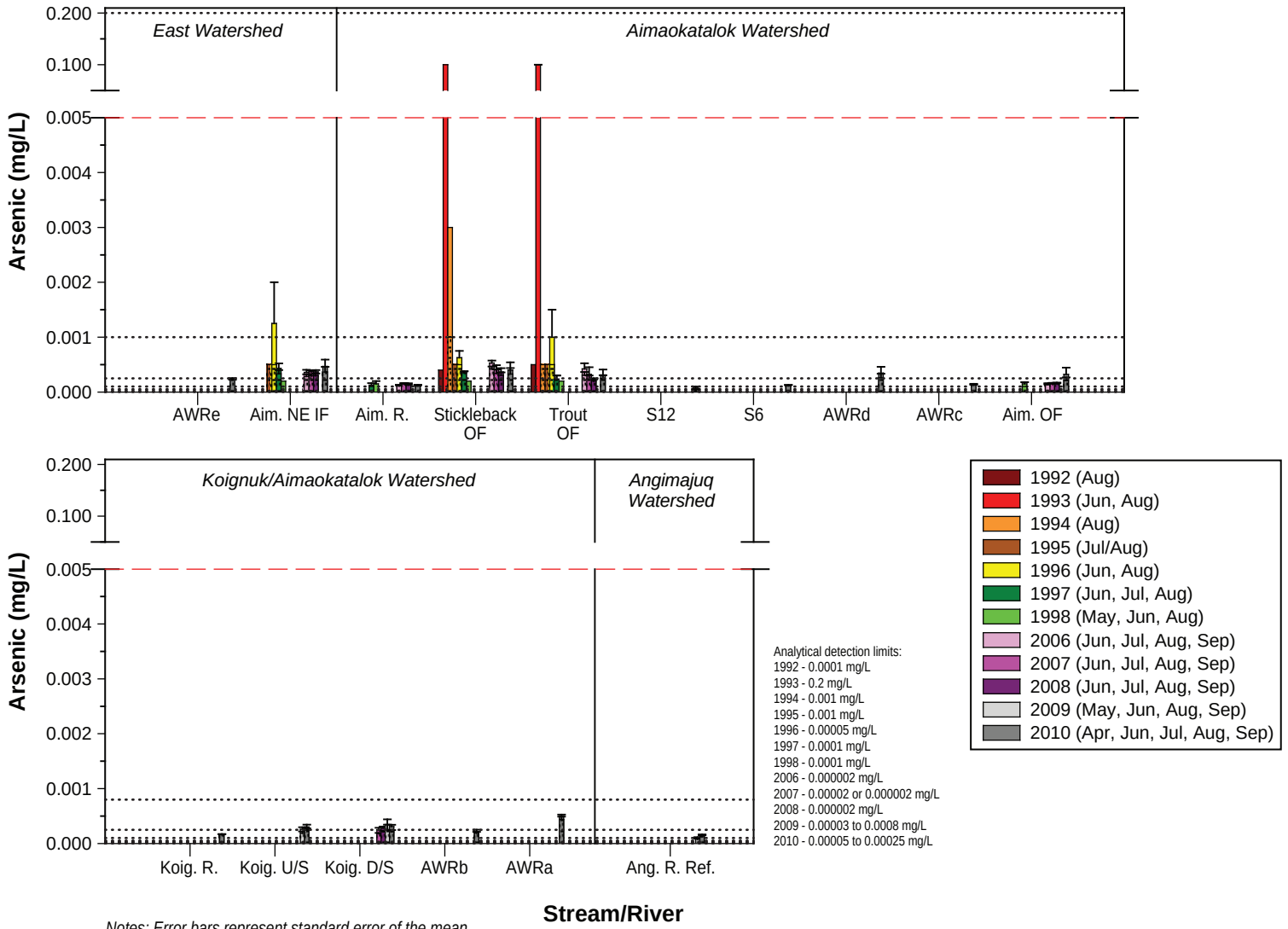
Figure 3.3-2l

NEWMONT NORTH AMERICA

Average Annual Aluminum Concentration in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2l

Rescan Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below the detection limit are plotted at half the detection limit.
Red dashed line represents CCME guideline (0.005 mg/L).
Solid columns represent total arsenic and superimposed dotted columns represent dissolved arsenic.
** Indicates average total arsenic concentrations that are both above the detection limit and higher than the CCME guideline.*

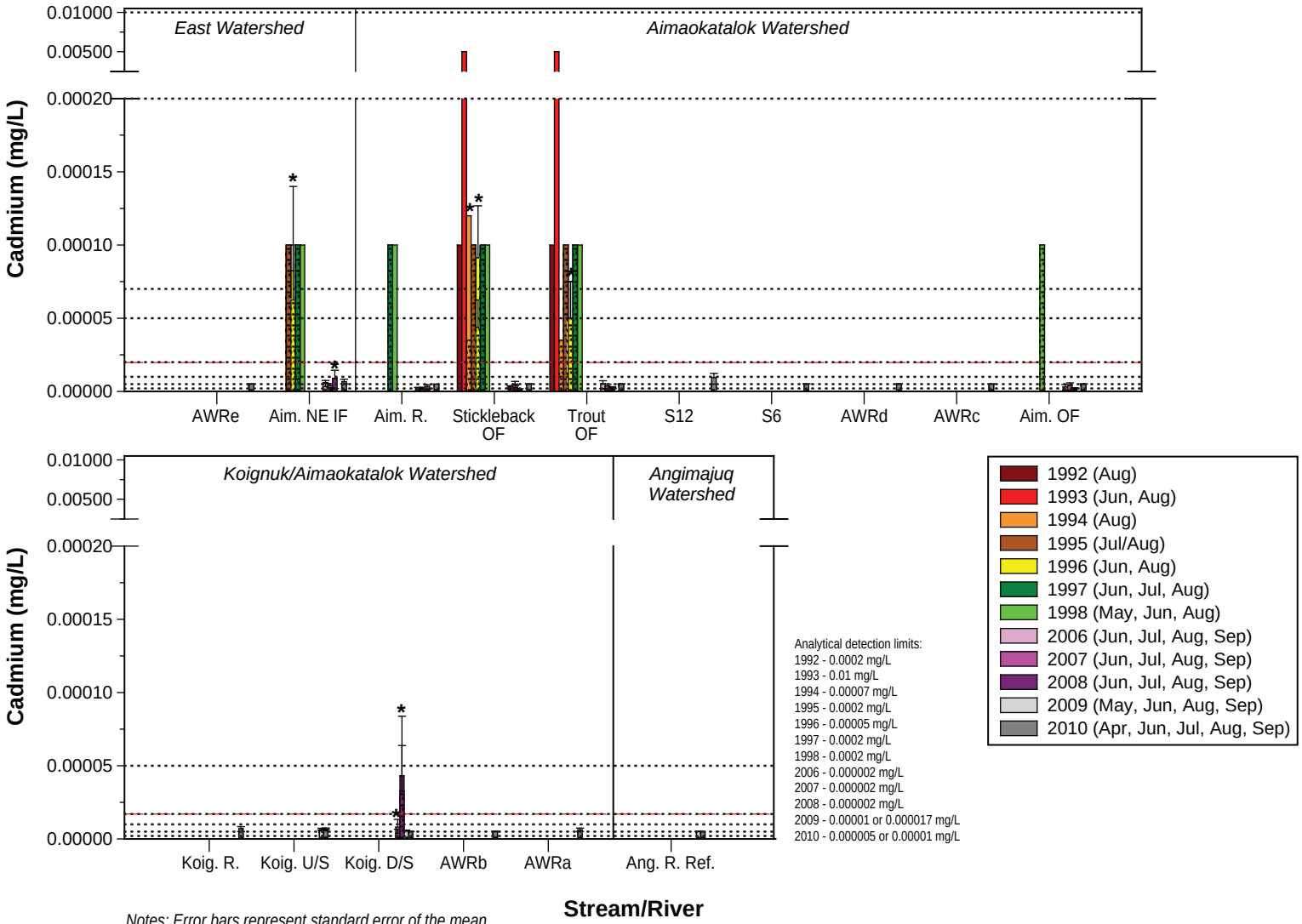
Figure 3.3-2m

NEWMONT NORTH AMERICA

Average Annual Arsenic Concentration in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2m

Rescan Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below the detection limit are plotted at half the detection limit.
Red dashed line represents CCME guideline (0.000017 mg/L). The equation for correcting this guideline for hardness is: $10^{[0.86[\log(\text{hardness})]-3.2)}/1000$.
Solid columns represent total cadmium and superimposed dotted columns represent dissolved cadmium.
** Indicates average total cadmium concentrations that are both above the detection limit and higher than the hardness-corrected CCME guideline.*

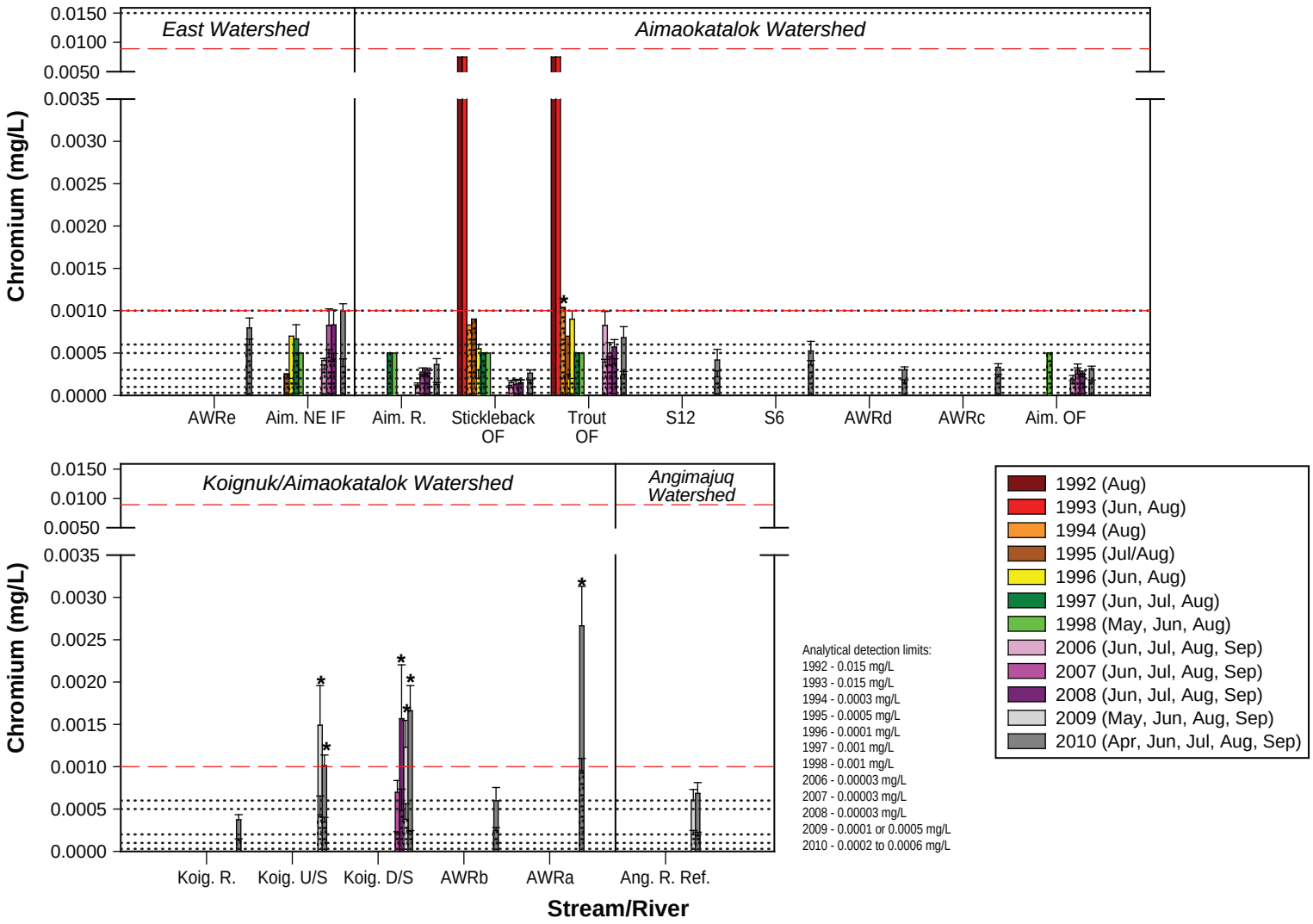
Figure 3.3-2n

NEWMONT NORTH AMERICA

Average Annual Cadmium Concentration in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2n

Rescan Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below the detection limit are plotted at half the detection limit.
Red dashed lines represent CCME guideline for hexavalent chromium (0.001 mg/L) and interim guideline for trivalent chromium (0.0089 mg/L).
Solid columns represent total chromium and superimposed dotted columns represent dissolved chromium.
** Indicates average total chromium concentrations that are both above the detection limit and higher than the CCME guideline for hexavalent chromium.*

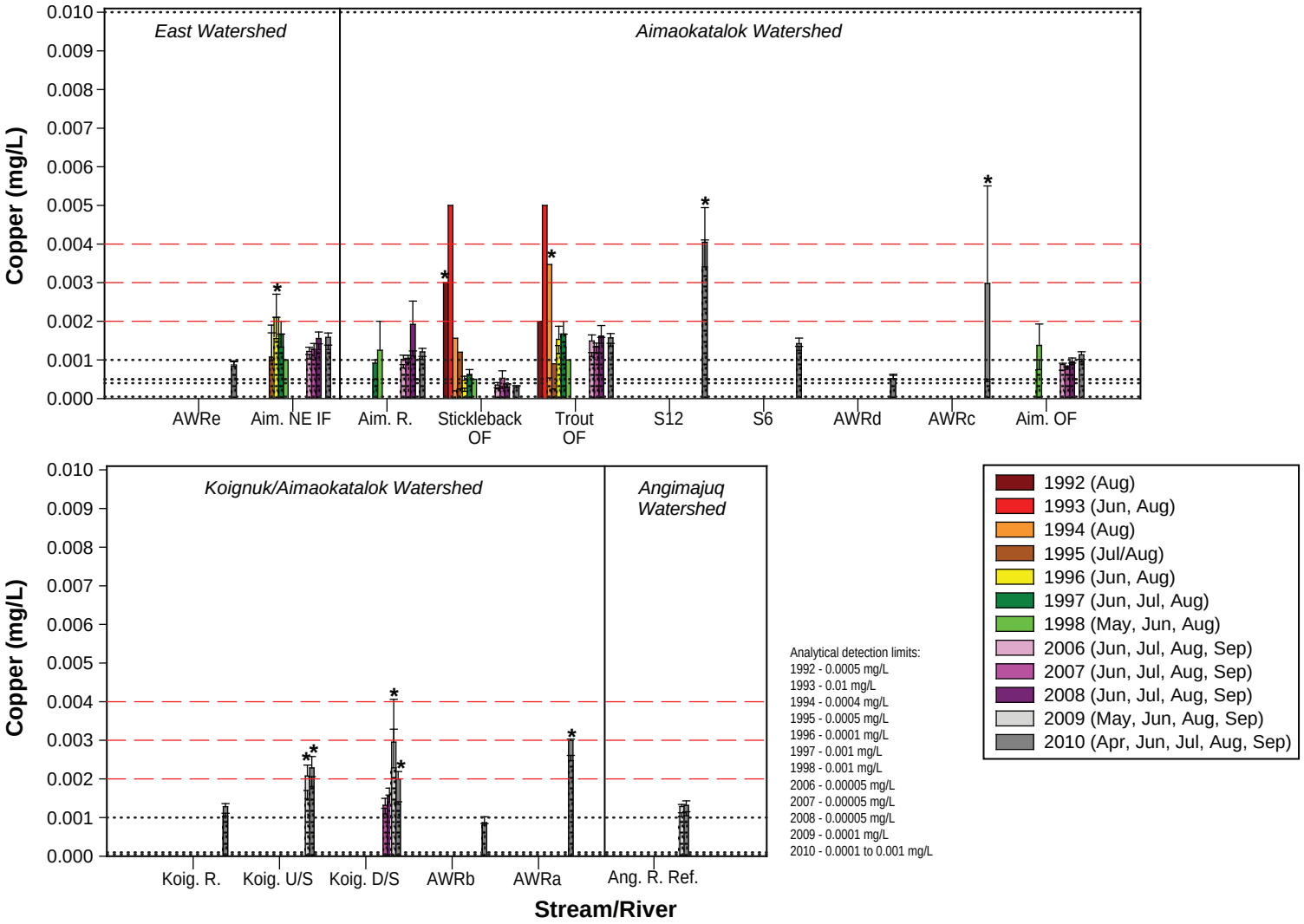
Figure 3.3-2o

NEWMONT NORTH AMERICA

Average Annual Chromium Concentration in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2o

Rescan Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below the detection limit are plotted at half the detection limit.
Red dashed lines represent hardness-dependent CCME guideline (0.002 mg/L at [$CaCO_3$] = 0–120 mg/L; 0.003 mg/L at [$CaCO_3$] = 120–180 mg/L; 0.004 mg/L at [$CaCO_3$] = >180 mg/L).
Solid columns represent total copper and superimposed dotted columns represent dissolved copper.
** Indicates average total copper concentrations that are both above the detection limit and higher than the CCME guideline.*

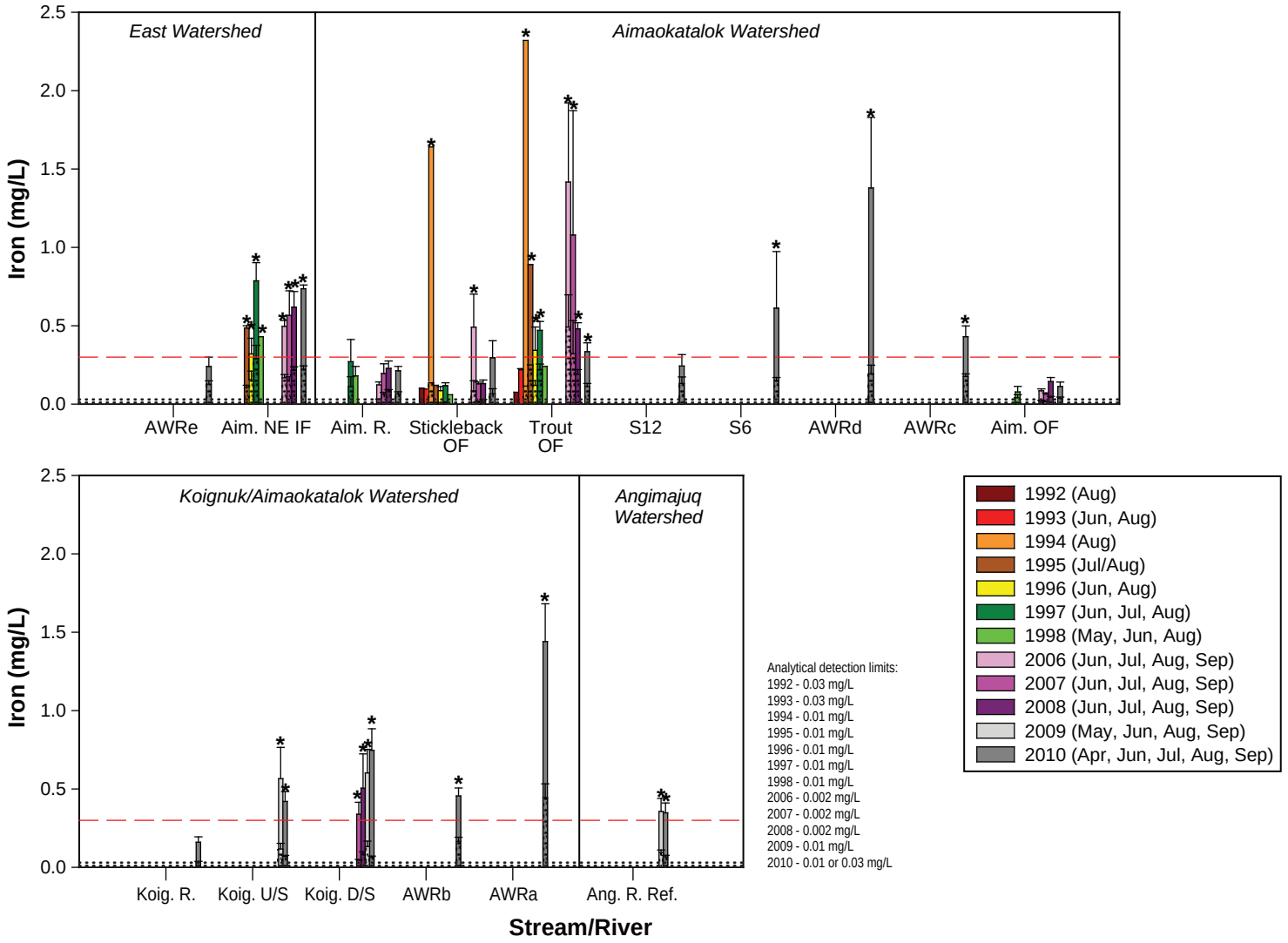
Figure 3.3-2p

NEWMONT NORTH AMERICA

Average Annual Copper Concentration in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2p

Rescan Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below the detection limit are plotted at half the detection limit.
Red dashed line represents CCME guideline (0.3 mg/L).
Solid columns represent total iron and superimposed dotted columns represent dissolved iron.
** Indicates average total iron concentrations that are both above the detection limit and higher than the CCME guideline.*

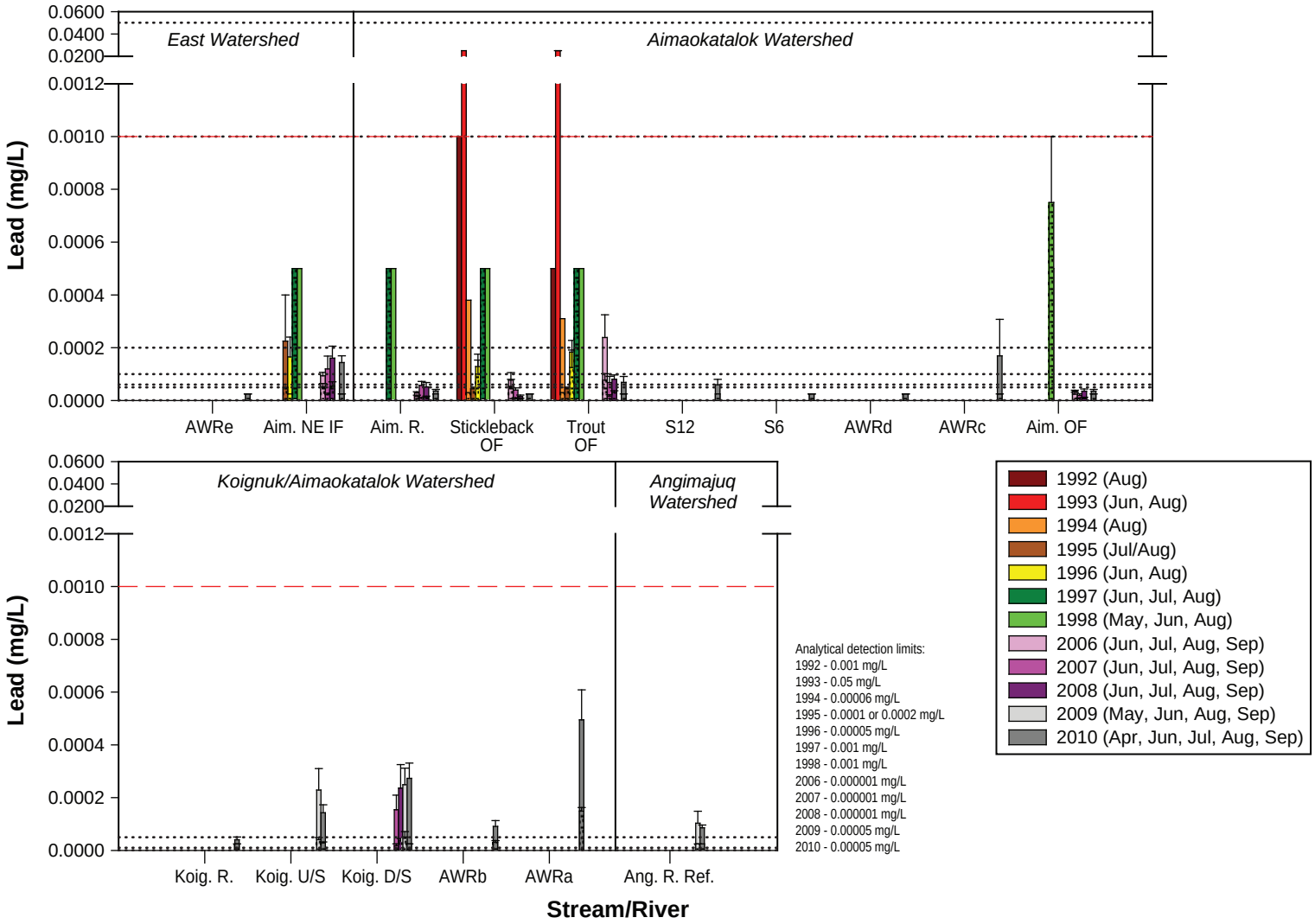
Figure 3.3-2q

NEWMONT NORTH AMERICA

Average Annual Iron Concentration in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2q

Rescan™ Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below detection limit are plotted at half the detection limit.
Red dashed lines represent CCME guideline (0.001 mg/L at [$CaCO_3$] = 0–60 mg/L; 0.002 mg/L at [$CaCO_3$] = 60–120 mg/L [not shown]; 0.004 mg/L at [$CaCO_3$] = 120–180 mg/L [not shown]; 0.007 mg/L at [$CaCO_3$] = >180 mg/L [not shown]).
Solid columns represent total lead and superimposed dotted columns represent dissolved lead.
** Indicates average total lead concentrations that are both above the detection limit and higher than the CCME guideline.*

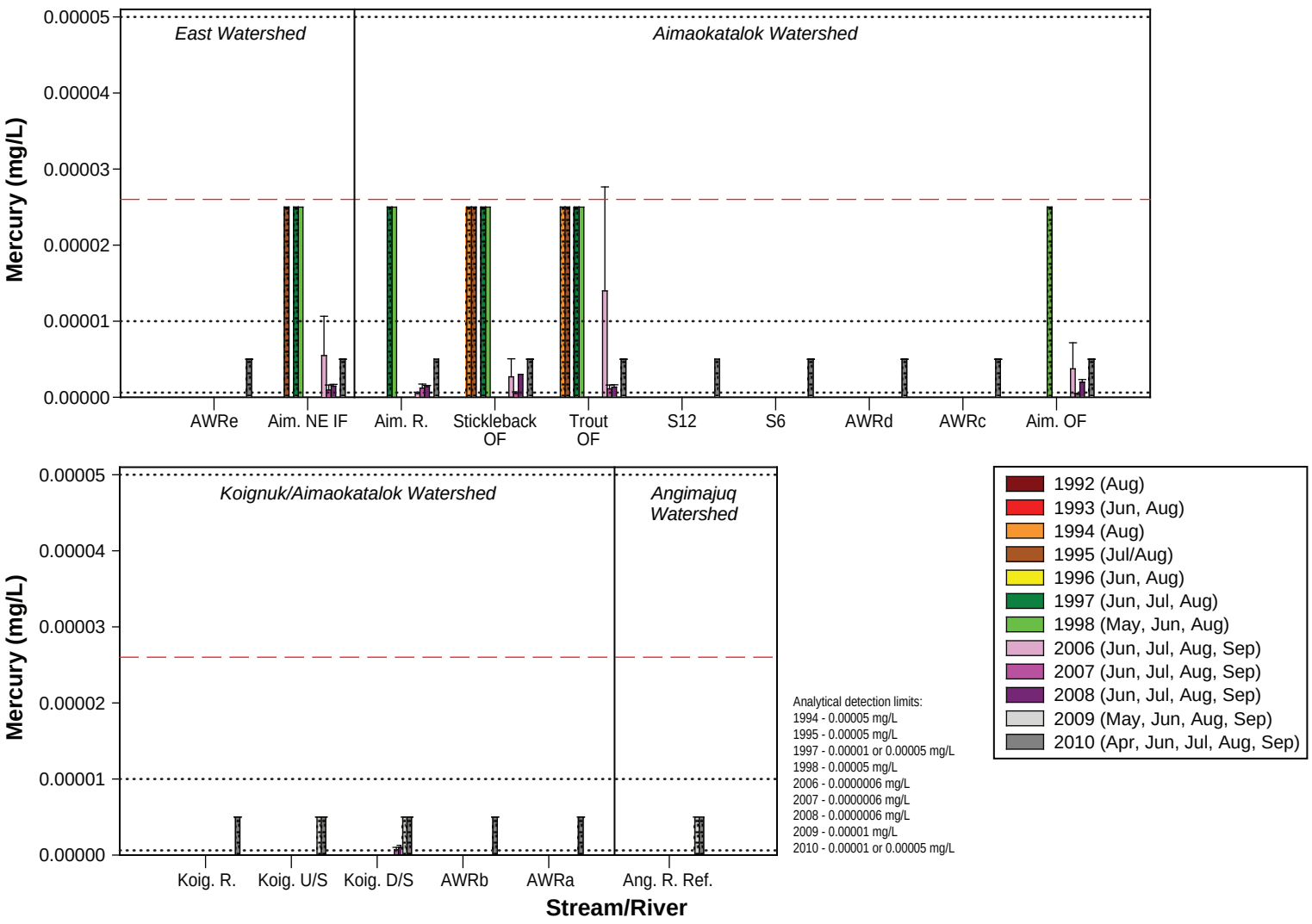
Figure 3.3-2r

NEWMONT NORTH AMERICA

Average Annual Lead Concentration in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2r

Rescan Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below detection limit are plotted at half the detection limit.
Red dashed line represents CCME guideline for inorganic mercury (0.000026 mg/L); the interim CCME guideline for methylmercury (0.000004 mg/L) is not shown.
Solid columns represent total mercury and superimposed dotted columns represent dissolved mercury.
** Indicates average total mercury concentrations that are both above the detection limit and higher than the CCME guideline for inorganic mercury.*

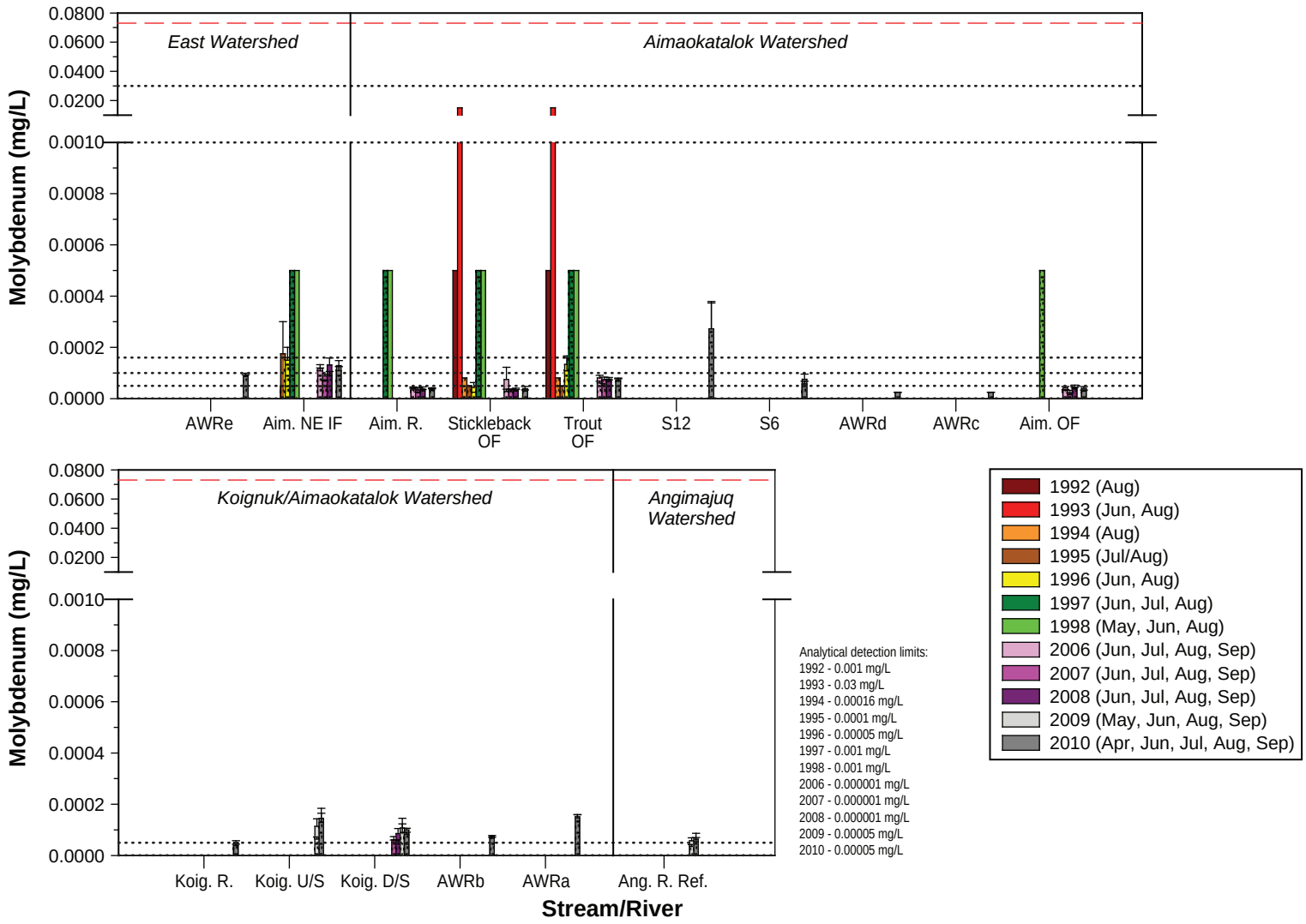
Figure 3.3-2s

NEWMONT NORTH AMERICA

Average Annual Mercury Concentration in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2s

Rescan Engineers & Scientists



Notes: Error bars represent standard error of the mean.
Dotted lines represent analytical detection limit; values below the detection limit are plotted at half the detection limit.
Red dashed line represents CCME guideline (0.073 mg/L).
Solid columns represent total molybdenum and superimposed dotted columns represent dissolved molybdenum.
** Indicates average total molybdenum concentrations that are both above the detection limit and higher than the CCME guideline.*

Figure 3.3-2t

NEWMONT NORTH AMERICA

Average Annual Molybdenum Concentration in Streams and Rivers, Hope Bay Belt Project, 1992-2010

Figure 3.3-2t

Rescan Engineers & Scientists