HW> 1996.02.01 Sheet metal feed rate report

New York State Department of Environmental Conservation
Division of Solid & Hazardous Materials
Bureau of Material Storage, Combustion & Regulation
50 Wolf Road, Albany, New York 12233-7251
518-457-9257 FAX 518-485-8769

Michael D. Zagata
Commissioner

MEMORANDUM

TO: William Clarke, Regional Permit Administrator

FROM: Isaac Natarajan, Environmental Engineer

SUBJECT: **Our Discussions concerning Norlite on 1/31/96**

DATE: February 1, 1996

Enclosed please find the revised report on requested revisions to Norlite shale metal feed rates. This is prepared in line with our discussions for 22T/hr and 25T/hr shale feed rates. Concerning the LGF flow rates at 10.1 g.p.m and 10.3 g.p.m, the metal feed rate will be the same as shown in the last column of the tables. This is because the flow rate is given in volume (Gallons) and not in weight (lbs.). For example if the specific gravity is 0.921 gm/ml the feed rate in weight will be 4750 lbs/hr for a 10.3 g.p.m. LGF feed. If the specific gravity is 0.825 gm/ml the feed rate in weight will be 4255 lbs/hr for the same feed rate in g.p.m., Volume of liquids also increases directly with temperature. Since the specific gravity and temperature of LGF is not the same for every batch, it will be difficult to monitor the metal feed rate in lbs. and the LGF feed rate in gallons. Therefore, it is preferable to have the allowable permit limit for metals the same irrespective of LGF feed rate. The total feed of LGF is limited in the permit to 10.1 gpm (which may be eventually increased to 10.3) mainly because the DRE and PIC emissions were determined at a specific LGF feed rate (10.3 gpm) during the trail burn. Concerning metals, the permit restricts how much metals can be fed to the kiln. As long as it is not exceeded, the LGF+SLGF+Waste Oil feed rate can be up to a maximum of 10.3 gpm of LGF and 1140 lbs/hr of SLGF. There is no limit on Waste Oil feed rate when burned along with hazardous waste as long as the total metal feed rate and thermal input is within the permit limit.

Enclosure.

cc: C. VanGuilder
S. Chetty
M. Detlefsen

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Michael D. Zagata
Commissioner

MEMORANDUM

TO: William Clarke, Regional Permit Administrator, Region IV

FROM: Isaac Natarajan, Environmental Engineer, Albany Office

SUBJECT: **Our discussion regarding shale metal feed rates for Norlite Rotary Kilns**

DATE: January 31, 1996

This is in reference to the discussions we had on January 5, 1995 concerning Norlite's request for revising the shale metal feed rates as proposed in the revised page C-2(5)a (dated 10/95). I calculated the expected emission rate using the permitted metal feed rates in the fuel (LGF+SLGF+Waste Oil) and the minimum demonstrated APC removal efficiency. I have also included in the Table the HRA emission limits. The results are given below:

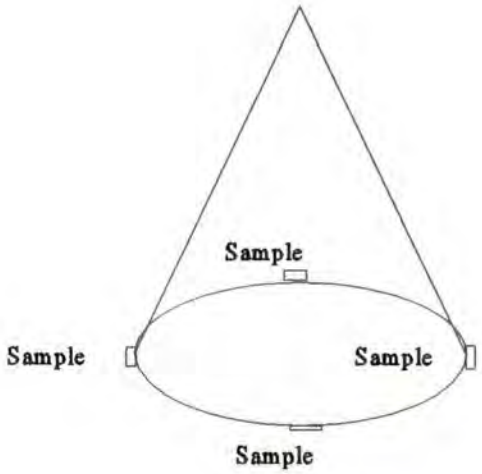
METAL	HRA Emission Limit	EMISSION LIMIT E=(L+S) R'	SHALE (22T/hr)		REMOVAL % (R)	REMOVAL % FACTOR R'=(1-R/100)	LGF +SLGF+Waste Oil (lbs/hr) (L)
			mg/kgm	Lbs/hr (S)			
Antimony	9.04E-04	8.14E-04	2.96	0.13	99.78	2.2 E-03	0.24
Arsenic	4.19E-04	9.37E-04	128	5.63**(2.45)**	99.9837	1.63E-04	0.12
Barium	7.63E-04	3.24E-03	1159	51**(11.45)**	99.99373	6.27E-05	0.72
Beryllium	6.31E-05	6.31E-05	3.0	0.132	99.95423	4.577E-04	0.0058
Cadmium	8.48E-04	8.358E-04	7.73	0.34	99.82732	1.7268E-03	0.144
Chrom(T)	1.59E-03	1.52E-03	127.7	5.62	99.9804	1.96E-04	2.16
Copper	6.93E-04	6.65E-04	190.5	8.38	99.99495	5.05E-05	4.8
Lead	4.46E-04	4.37E-04	87.3	3.84	99.9933	6.7E-05	2.69
Mercury	5.31E-02	8.37E-02	0.8	0.0352	66.67	0.333	0.216 **(0.124)**

METAL	HRA Emission Limit	EMISSION LIMIT E=(L+S) R'	SHALE (22T/hr)		REMOVAL % (R)	REMOVAL % FACTOR R'=(1-R/100)	LGF +SLGF+Waste Oil (lbs/hr) (L)
			mg/kgm	Lbs/hr (S)			
Nickel	9.91E-03	9.75E-03	95.0	4.18	99.86181	1.3819 E-03	2.88
Selenium	6.02E-04	5.82E-04	1.2	0.0528	99.66322	3.3678E-03	0.12
Silver	6.05E-04	6.025E-04	39.1	1.72	99.96682	3.318E-04	0.096
Thallium	7.27E-05	7.15E-05	7.5	0.33	99.98745	1.255E-04	0.24
Zinc	3.21E-02	2.623E-02	493.6	21.72	99.8797	1.203E-03	0.12

The calculations show that if the proposed shale metal feed rates are used it will result in emission rates for Arsenic, Barium and mercury at 9.37E-04, 3.24E-03 and 8.37E-02 respectively which are more than the HRA emission levels for these metals. The suggested revisions to the metal feed rates for these metals to remain within the HRA emission limits is indicated in the table in bold letters within a bracket.

Using the shale concentration limits (mg/kg) the enclosed graphs were generated for the analytical results of quarterly composites and core samples after each quarry blast. The variability in core samples is found to be more pronounced than the quarterly composites. The shale analysis based on quarterly composite is not acceptable to the Department. The Department suggests the following sampling procedure:

After each quarry blast one composite sample shall be collected from the pile by taking four samples diagonally opposite in the pile. Each quarry blast pile shall be given a batch number and fed to the kiln as a separate batch adjusting the shale feed rate in accordance with the permitted metal feed rates. We would like to discuss with Norlite the method by which this can be included in the database for computerized control of metal feed rates.



Using the maximum feed rate for LGF + SLGF per kiln from the trial burn and HRA emission rate, the maximum shale metal feed rate acceptable to the Department for a 25 T/hr shale feed rate is calculated and given below. These data shall be considered while allowing Norlite to increase the shale feed from 22T/hr to 25T/hr.

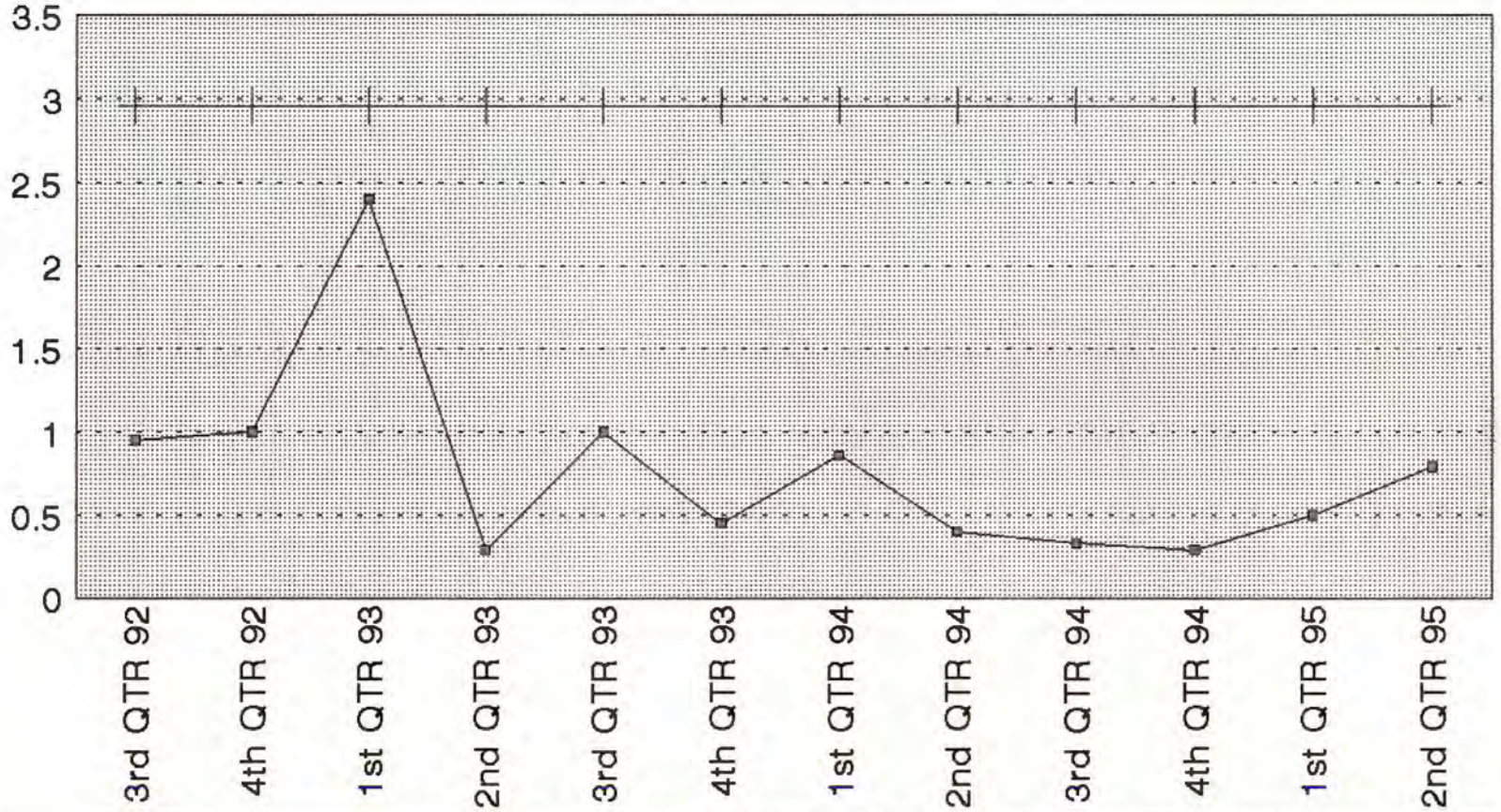
METAL	HRA EMISSION LIMIT (E)	SHALE (25T/hr) (E/R') -L		REMOVAL % (R)	REMOVAL FACTOR R'=(1-R/100)	LGF+SLGF+ Waste Oil (lbs/hr) (L)
		mg/kg	Lbs/hr			
Antimony	9.04E-04	2.6	0.13	99.78	2.2 E-03	0.281
Arsenic	4.19E-04	49	2.45	99.9837	1.63E-04	0.12
Barium	7.63E-04	228	11.4	99.99373	6.27E-05	0.764
Beryllium	6.31E-05	2.64	0.132	99.95423	4.577E-04	0.0058
Cadmium	8.48E-04	6.8	0.34	99.82732	1.7268E-03	0.151
Chromium(T)	1.59E-03	112.78	5.64	99.9804	1.96E-04	2.473
Copper	6.93E-04	167.6	8.38	99.99495	5.05E-05	5.343
Lead	4.46E-04	76.70	3.835	99.9933	6.7E-05	2.822
Mercury	5.31E-02	0.71	0.035	66.67	0.333	0.124
Nickel	9.91E-03	83.6	4.18	99.86181	1.3819 E-03	2.991
Selenium	6.02E-04	1.055	0.0528	99.66322	3.3678E-03	0.126
Silver	6.05E-04	34.52	1.72	99.96682	3.318E-04	0.102
Thallium	7.27E-05	6.6	0.33	99.98745	1.255E-04	0.249
Zinc	3.21E-02	435.2	21.76	99.8797	1.203E-03	4.923

I propose a meeting be arranged with Norlite to resolve this issue.

cc: C. VanGuilder
S. Chetty
M. Detlefsen

METALS CONCENTRATIONS IN THE SHALE

ANTIMONY

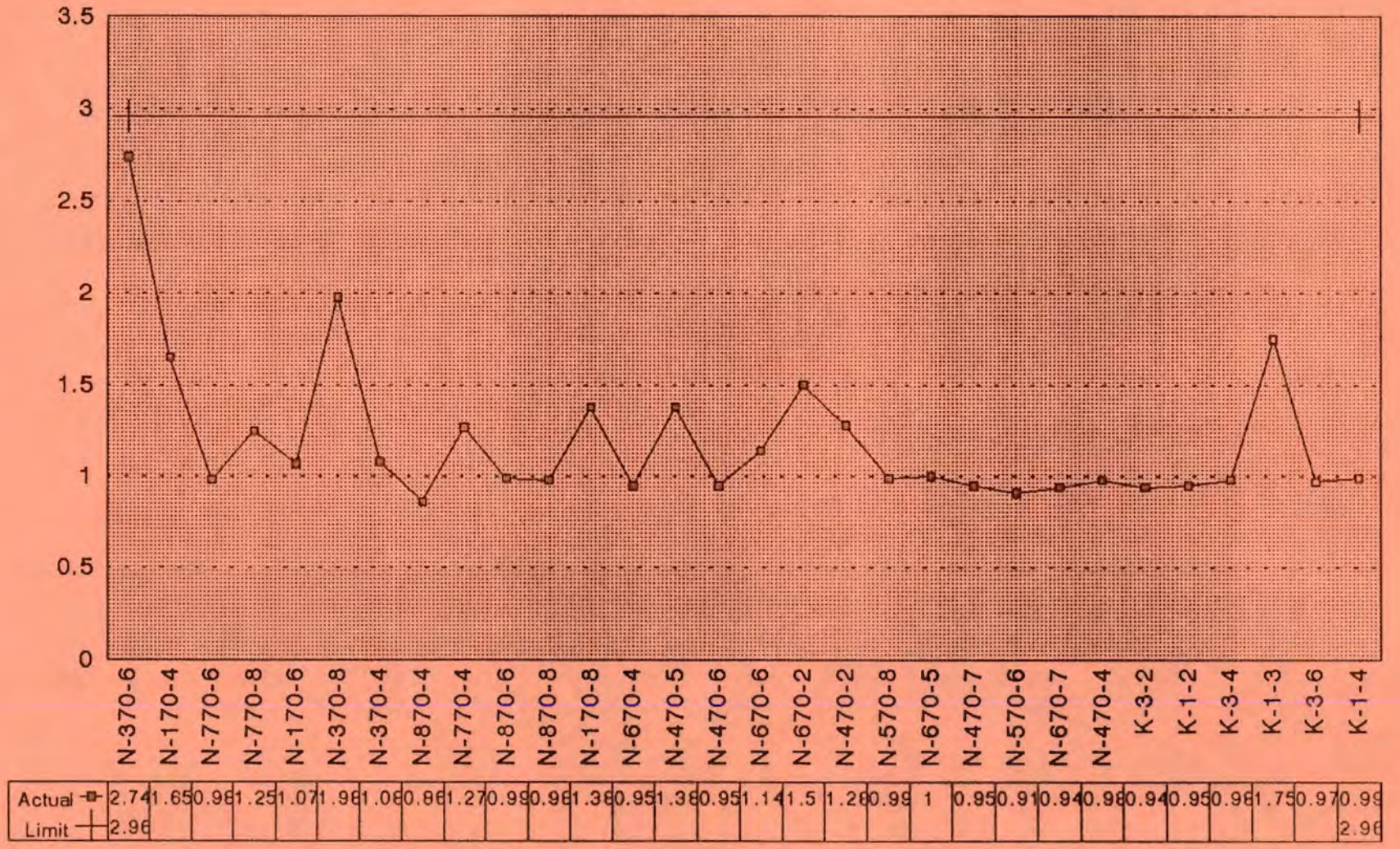


	3rd QTR 92	4th QTR 92	1st QTR 93	2nd QTR 93	3rd QTR 93	4th QTR 93	1st QTR 94	2nd QTR 94	3rd QTR 94	4th QTR 94	1st QTR 95	2nd QTR 95
Actual	0.95	1	2.4	0.29	1	0.45	0.86	0.4	0.33	0.29	0.5	0.79
Limit	2.96	2.96	2.96	2.96	2.96	2.96	2.96	2.96	2.96	2.96	2.96	2.96

1992 TO 1995 (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

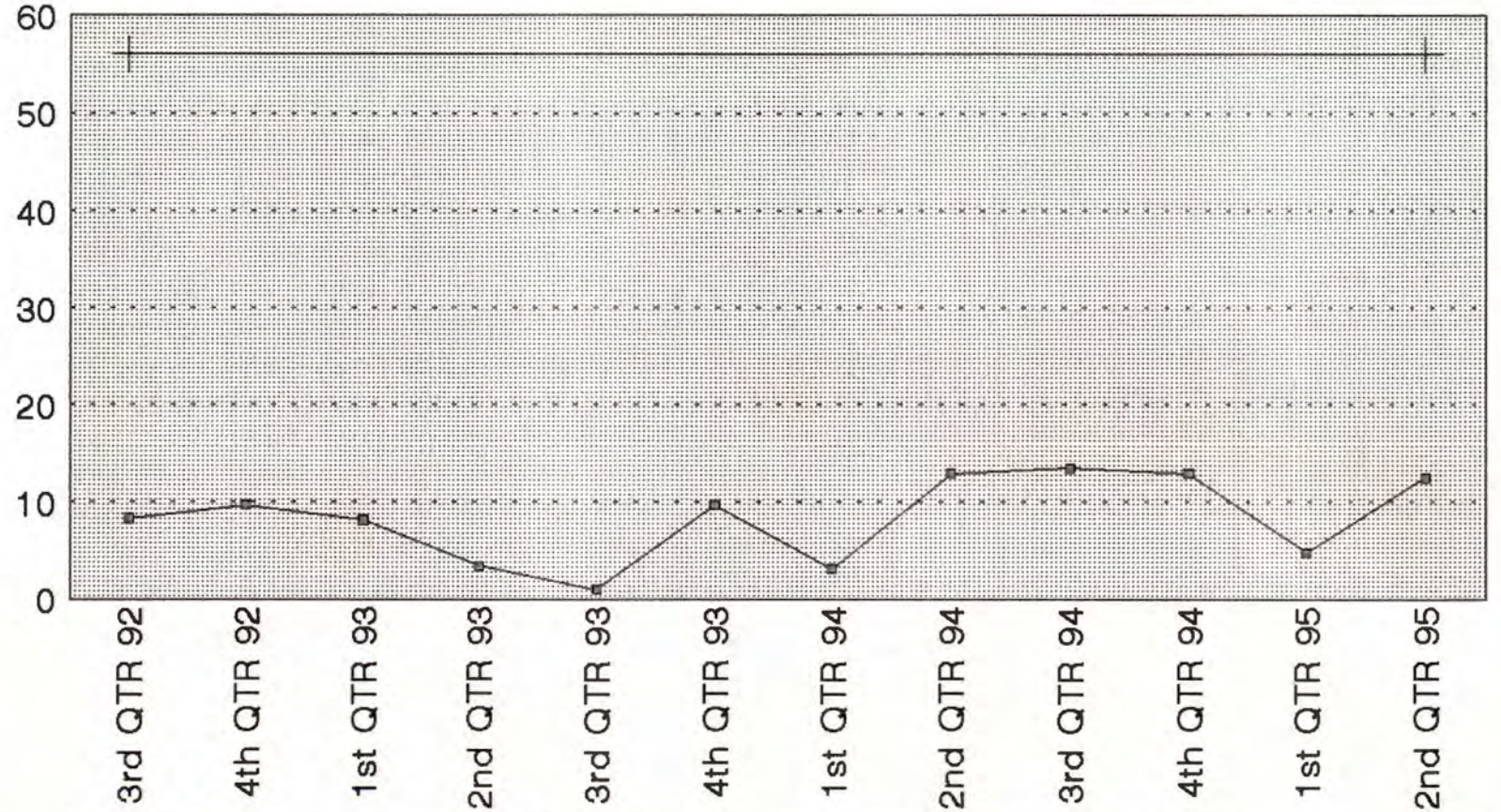
ANTIMONY



QUARRY CORE SAMPLES (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

ARSENIC

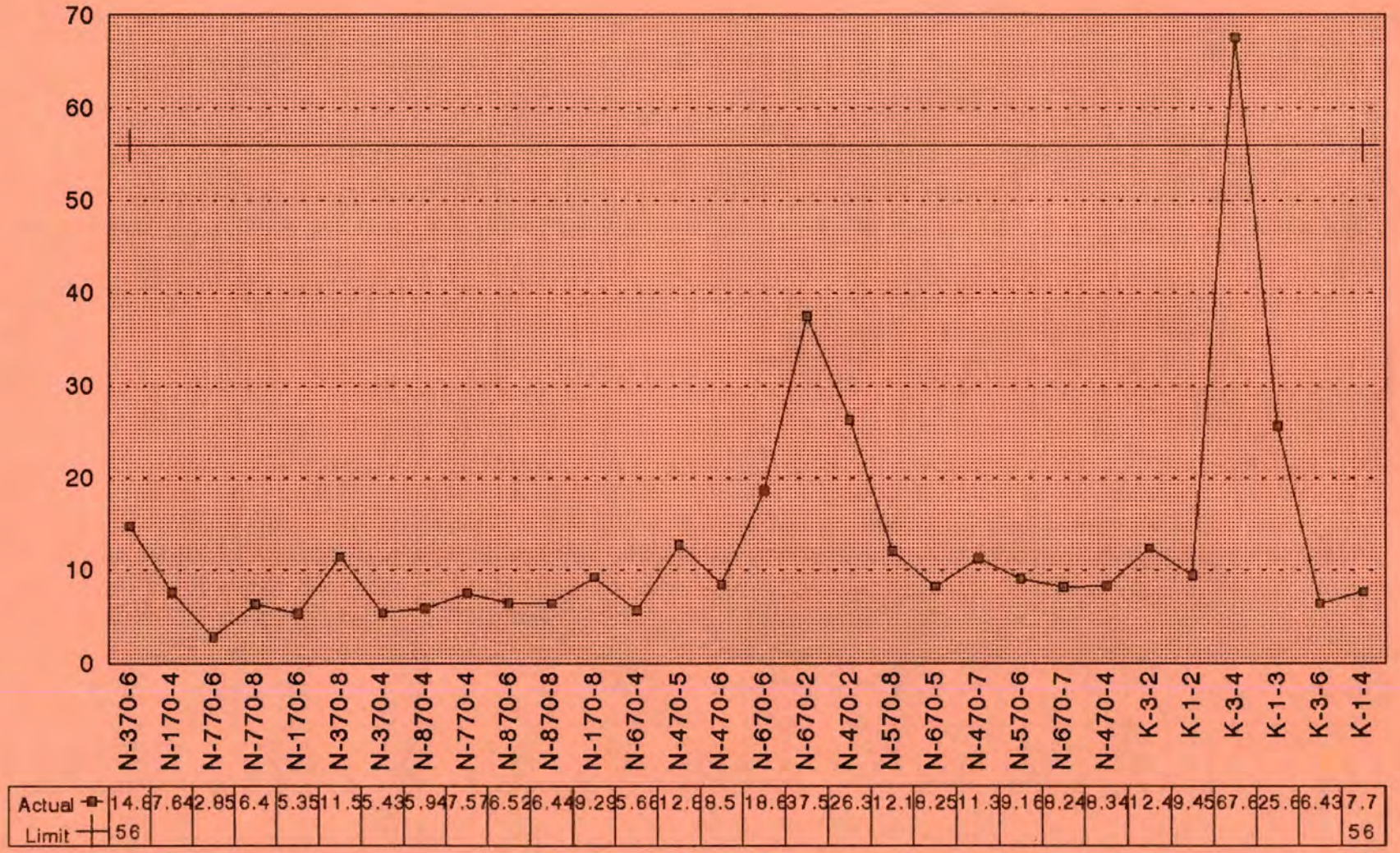


Actual	8.3	9.7	8.2	3.4	1	9.7	3.1	12.95	13.5	12.95	4.8	12.52
Limit	56											56

1992 TO 1995 (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

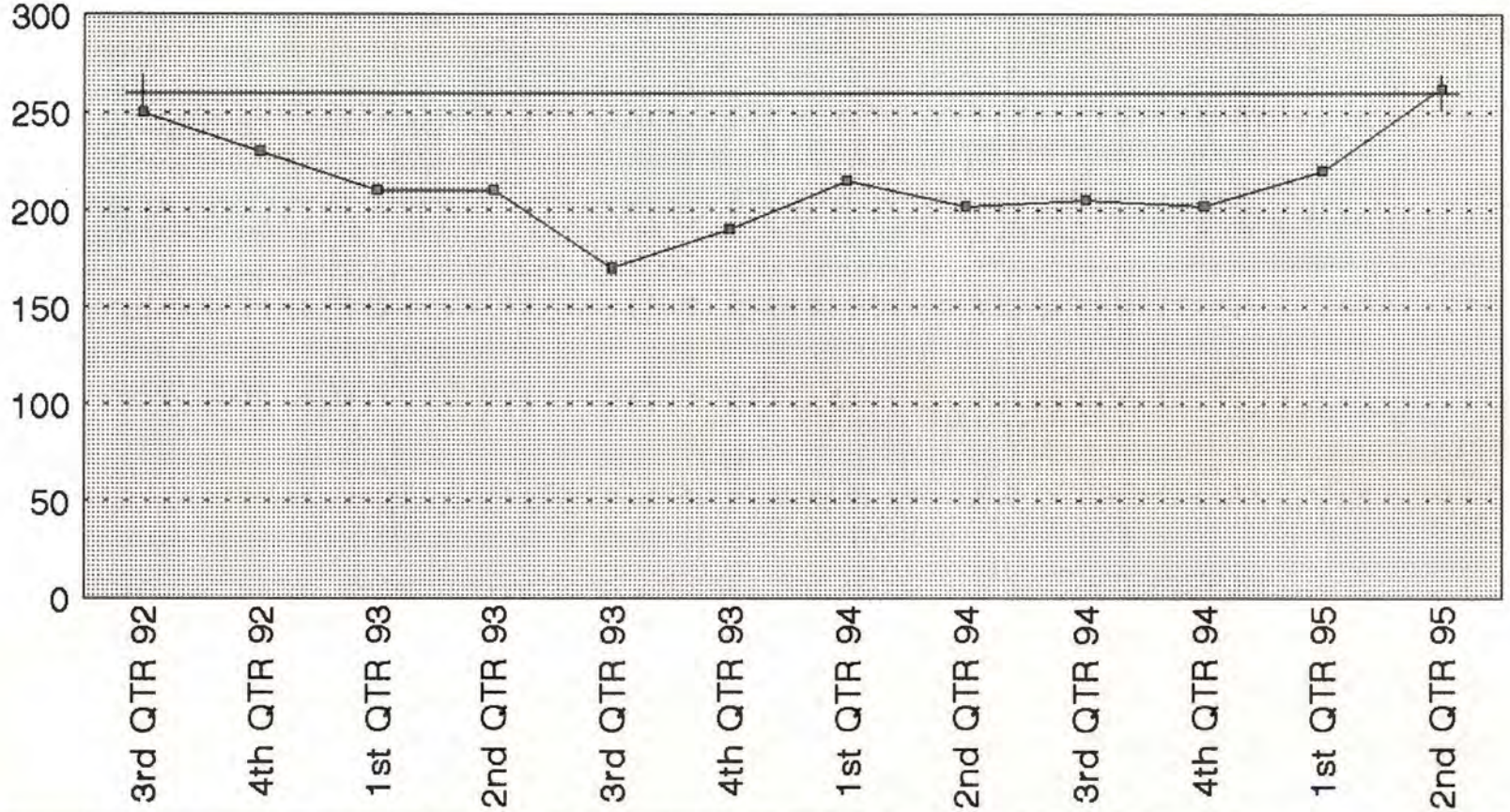
ARSENIC (MG/KG)



QUARRY CORE SAMPLES (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

BARIUM

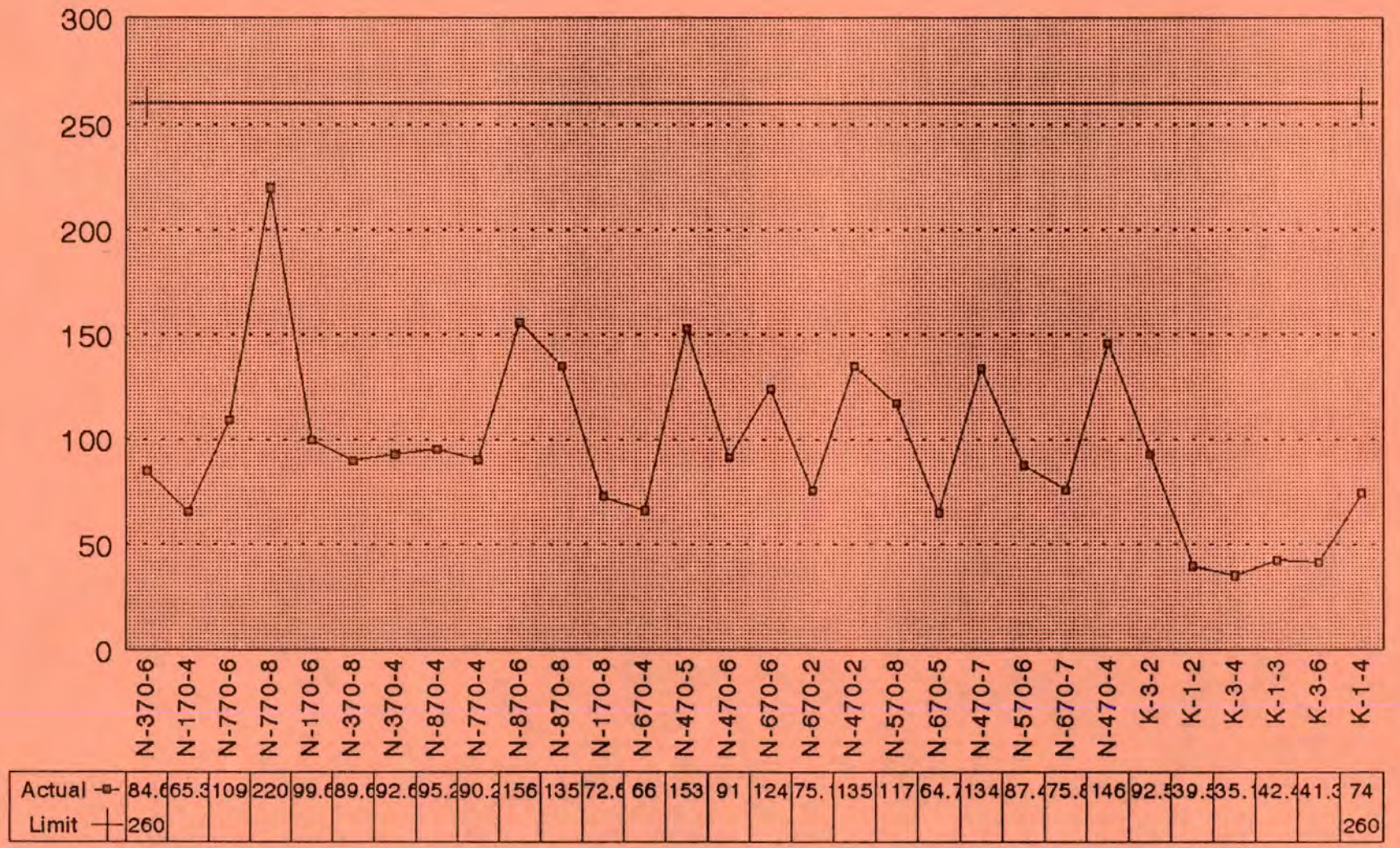


	3rd QTR 92	4th QTR 92	1st QTR 93	2nd QTR 93	3rd QTR 93	4th QTR 93	1st QTR 94	2nd QTR 94	3rd QTR 94	4th QTR 94	1st QTR 95	2nd QTR 95
Actual	250	230	210	210	170	190	215	202	205	202	220	262
Limit	260											260

1992 TO 1995

METALS CONCENTRATIONS IN THE SHALE

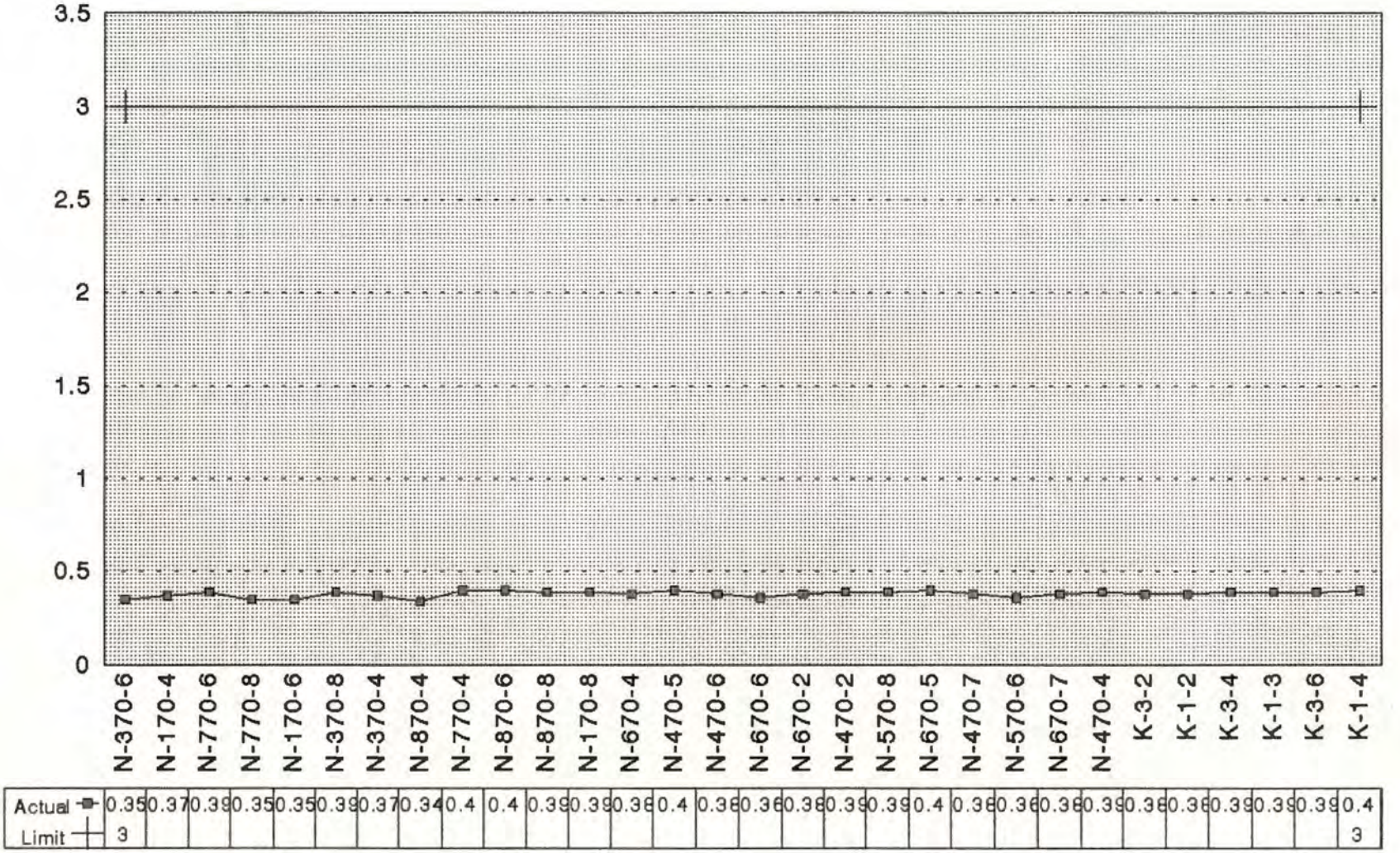
BARIUM



QUARRY CORE SAMPLE (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

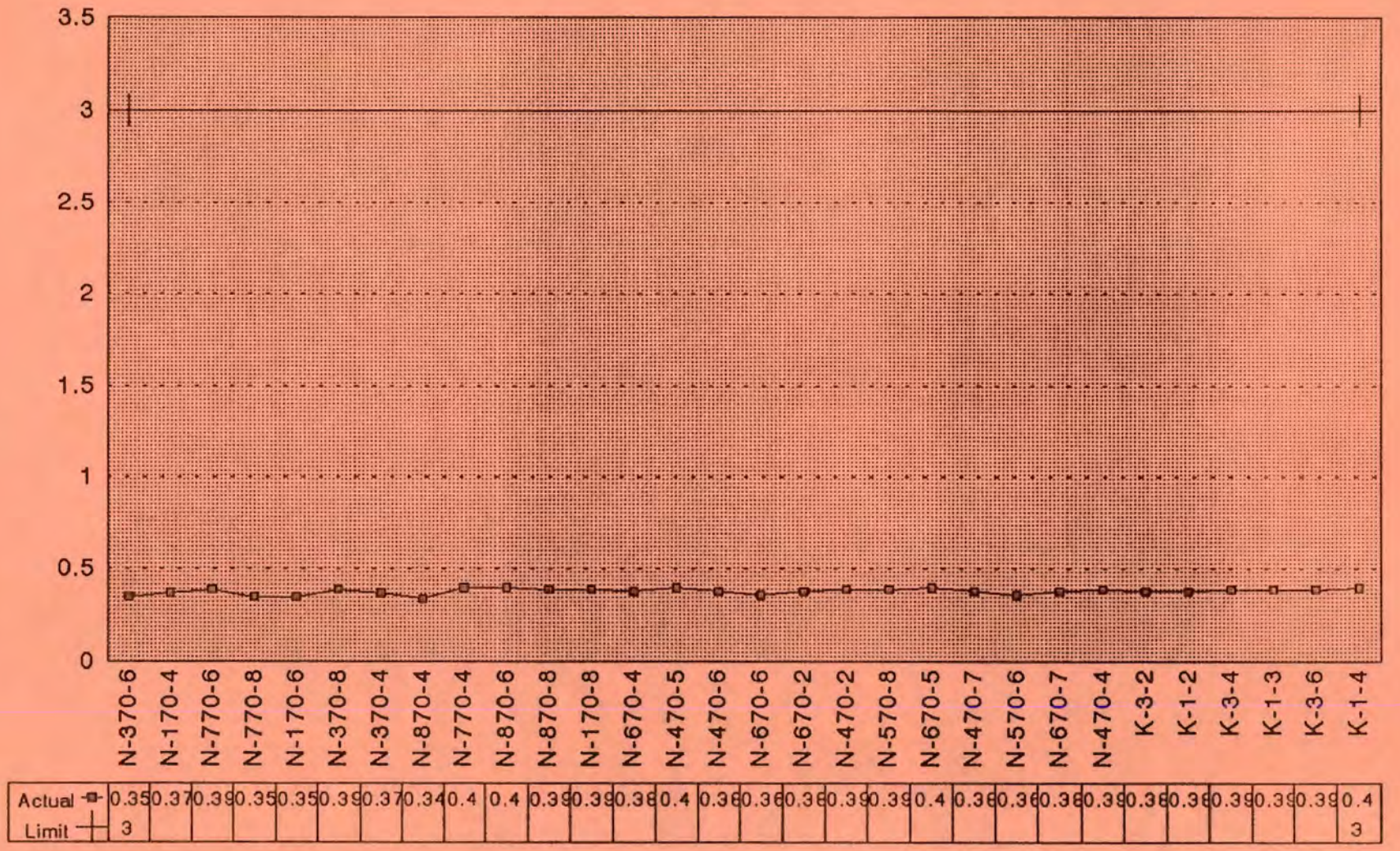
BERYLLIUM



QUARRY CORE SAMPLES (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

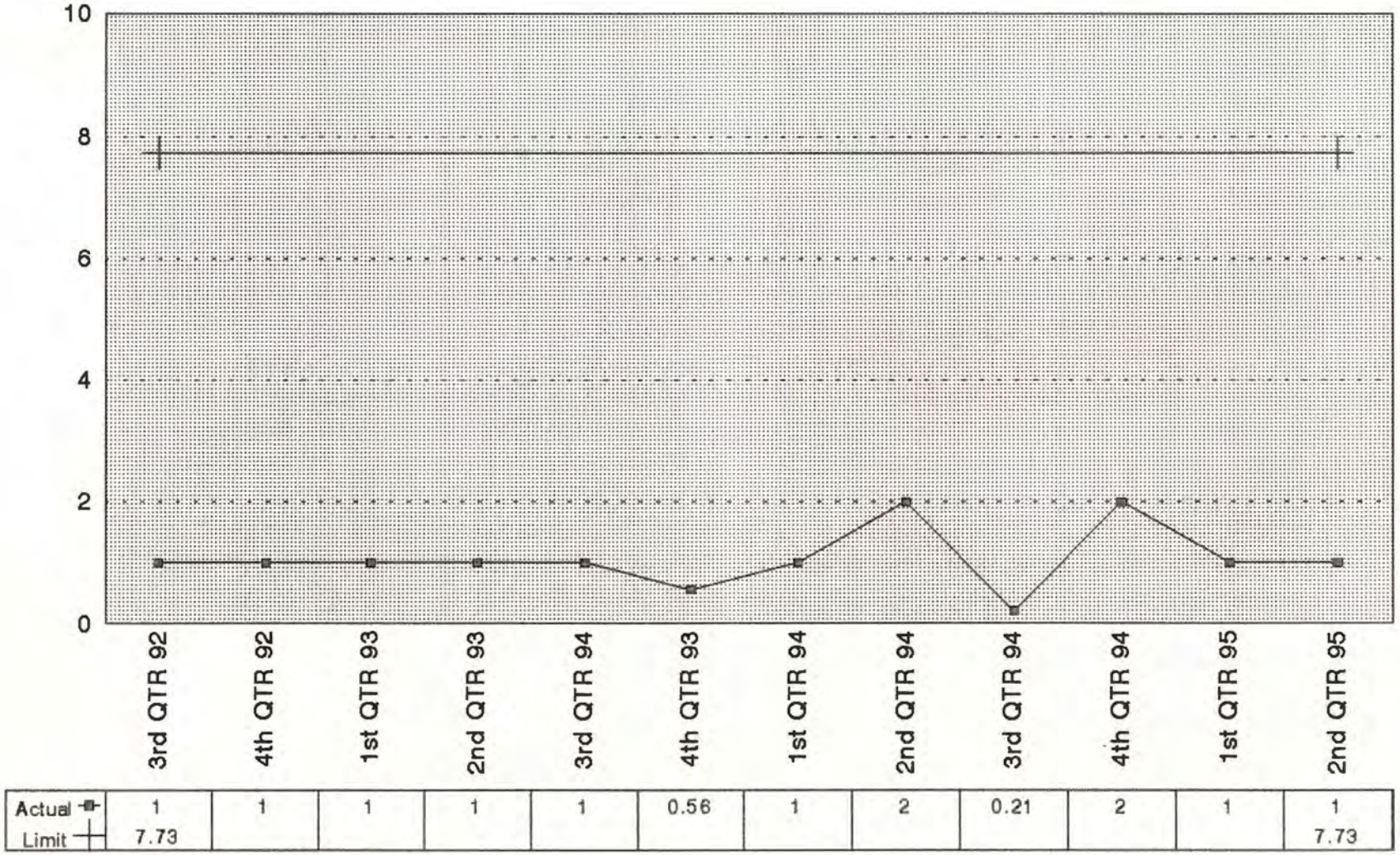
BERYLLIUM



QUARRY CORE SAMPLES (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

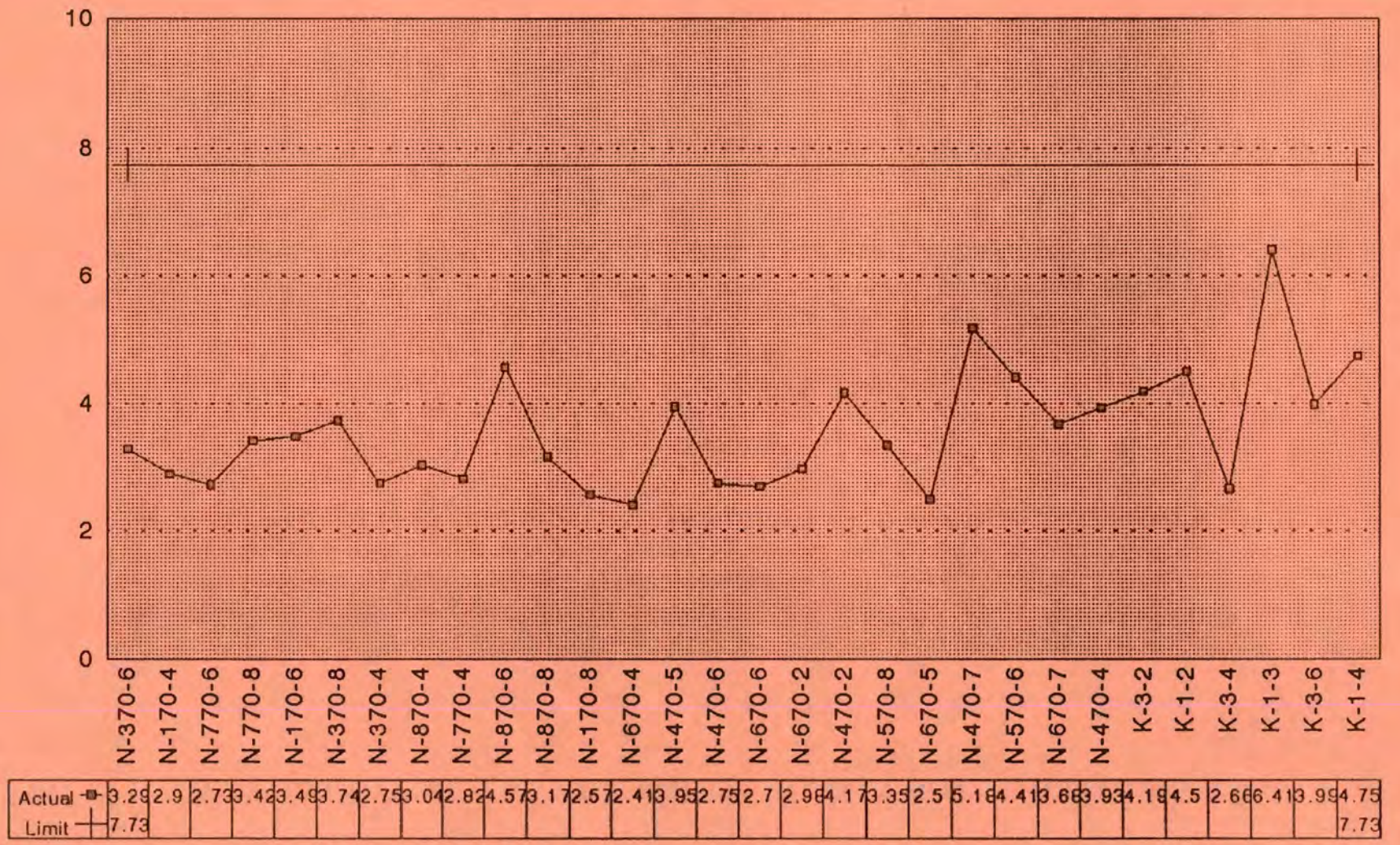
CADMIUM (MG/KG)



1992 TO 1995 (FOR 22T/HR)

METALS CONCENTRATIONS IN THE SHALE

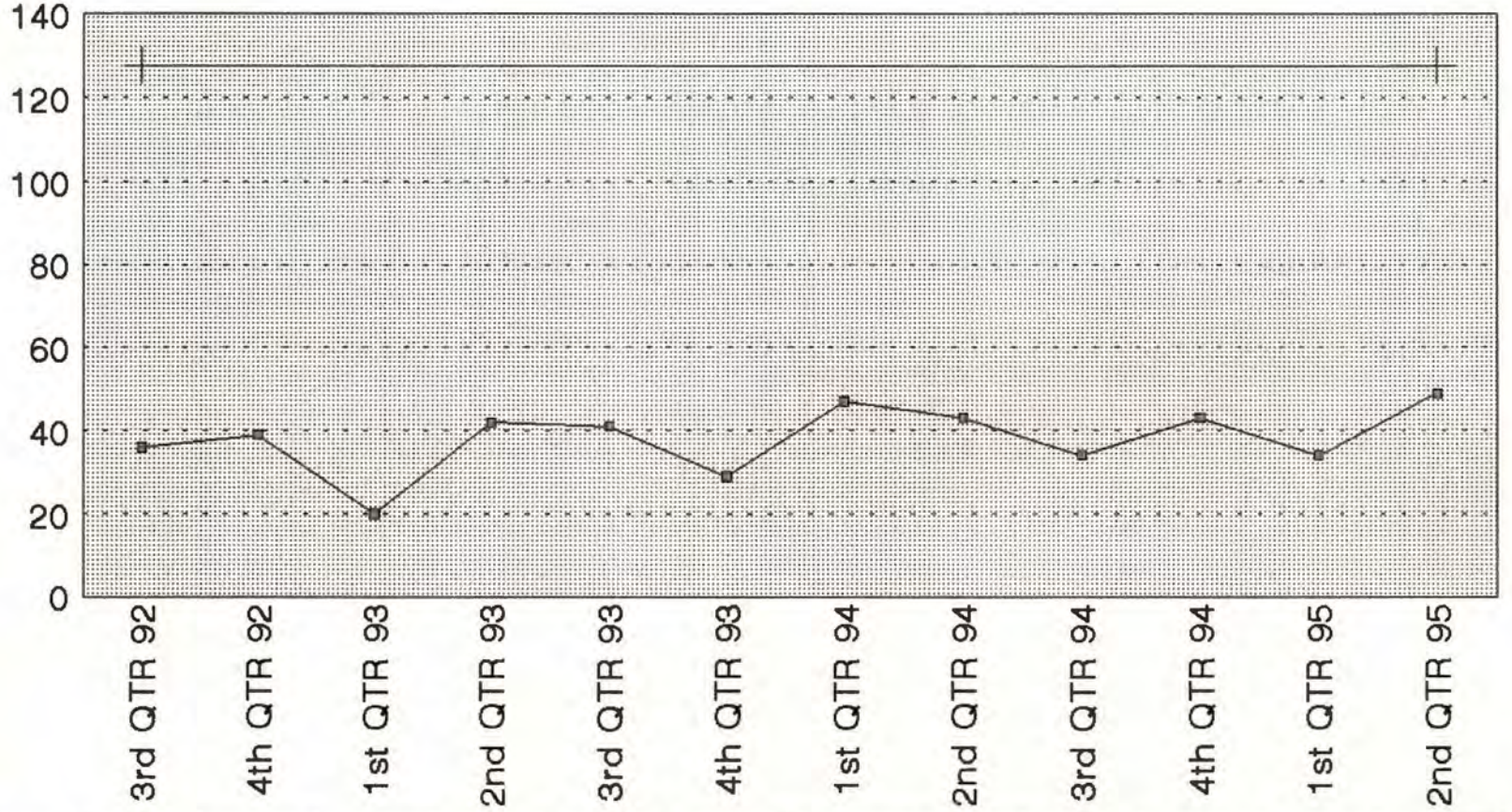
CADMIUM (MG/KG)



QUARRY CORE SAMPLES (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

CHROMIUM

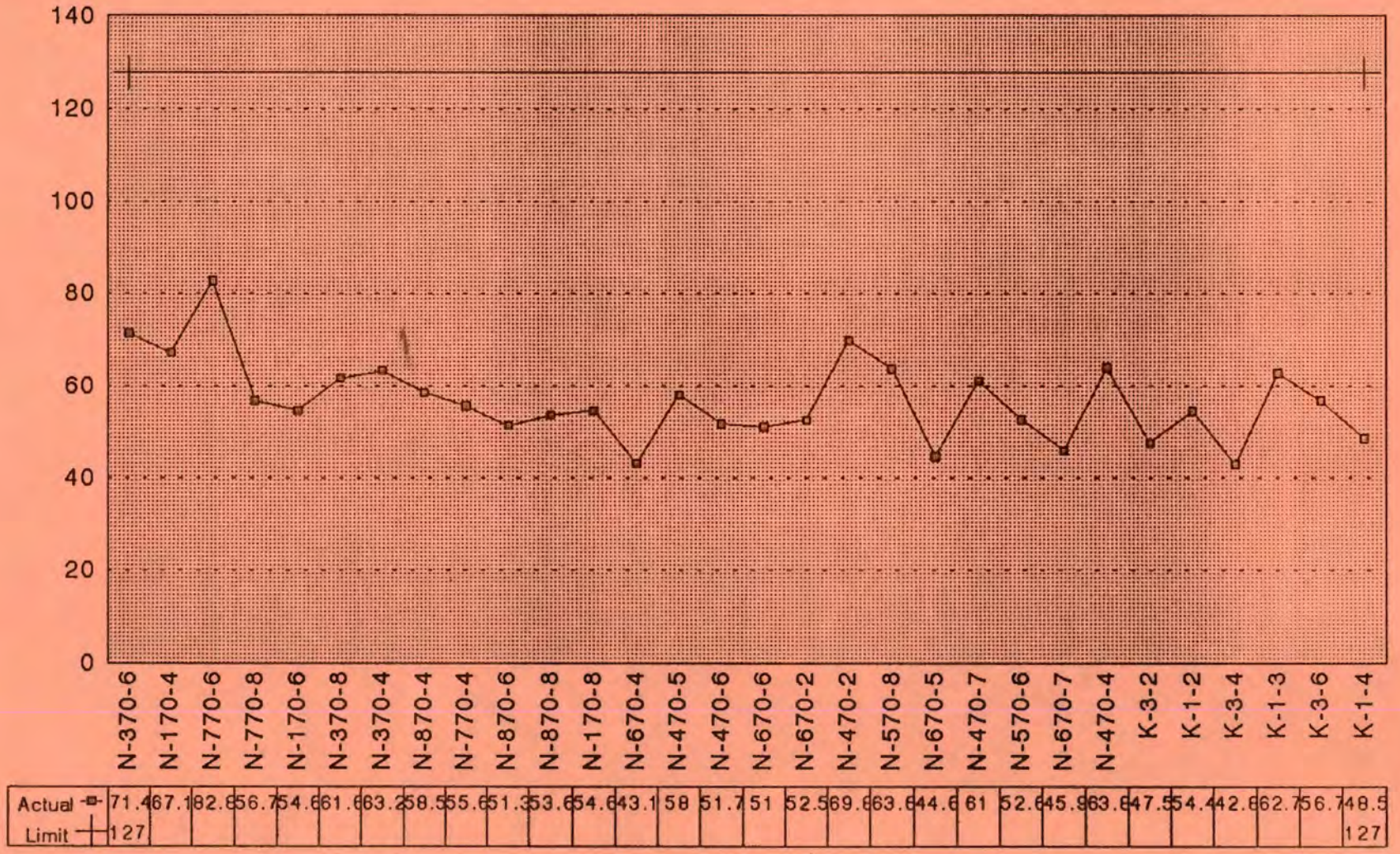


Actual	36	39	20	42	41	29	47	43	34	43	34	49
Limit	127.7											127.7

1992 TO 1995 (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

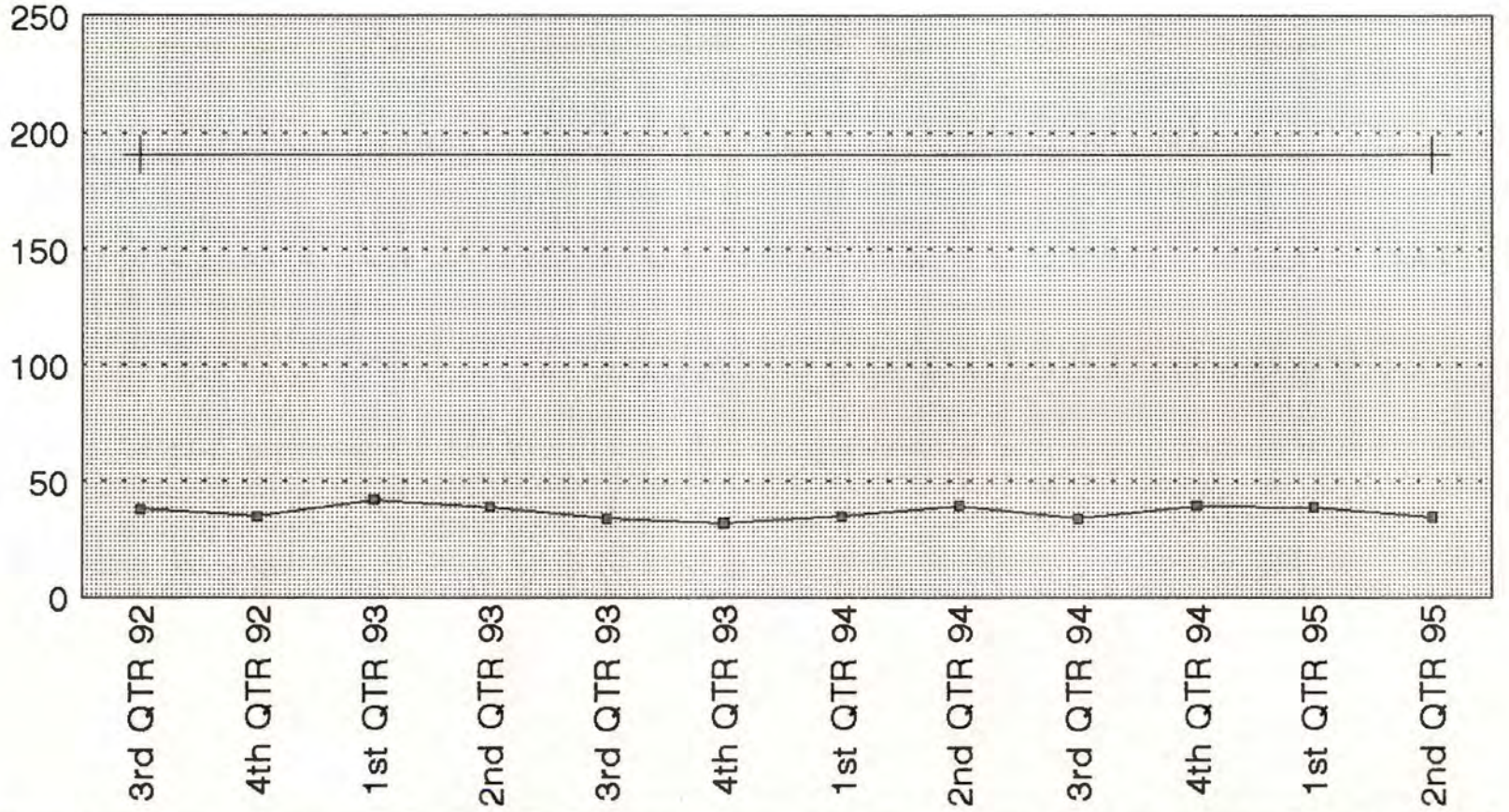
CHROMIUM



QUARRY CORE SAMPLES (MG/KG) (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

COPPER (MG/KGM)

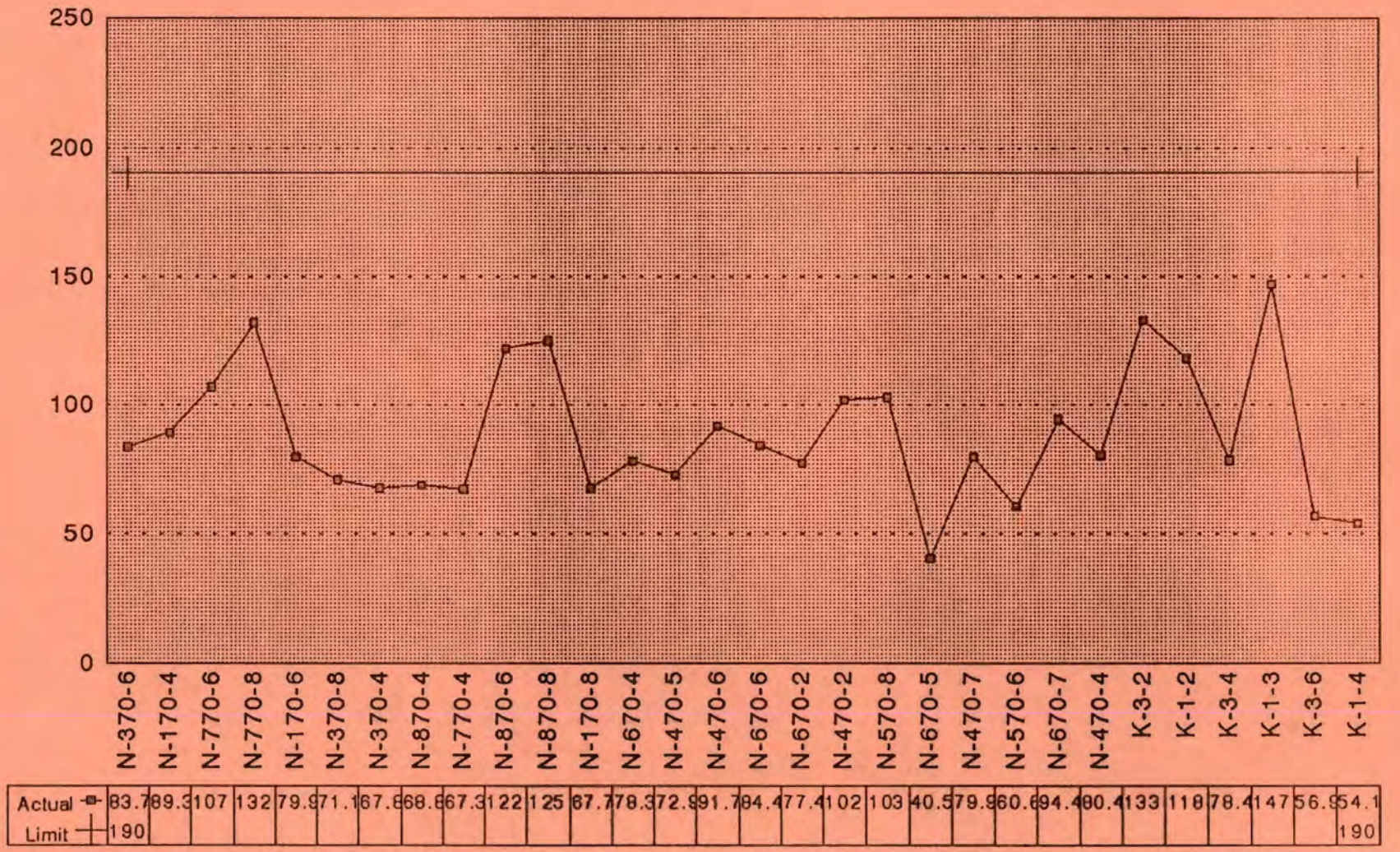


Actual	38	35	42	39	34	32	35	39.5	34	39.5	39	34.6
Limit	190.5											190.5

1992 TO 1995 (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

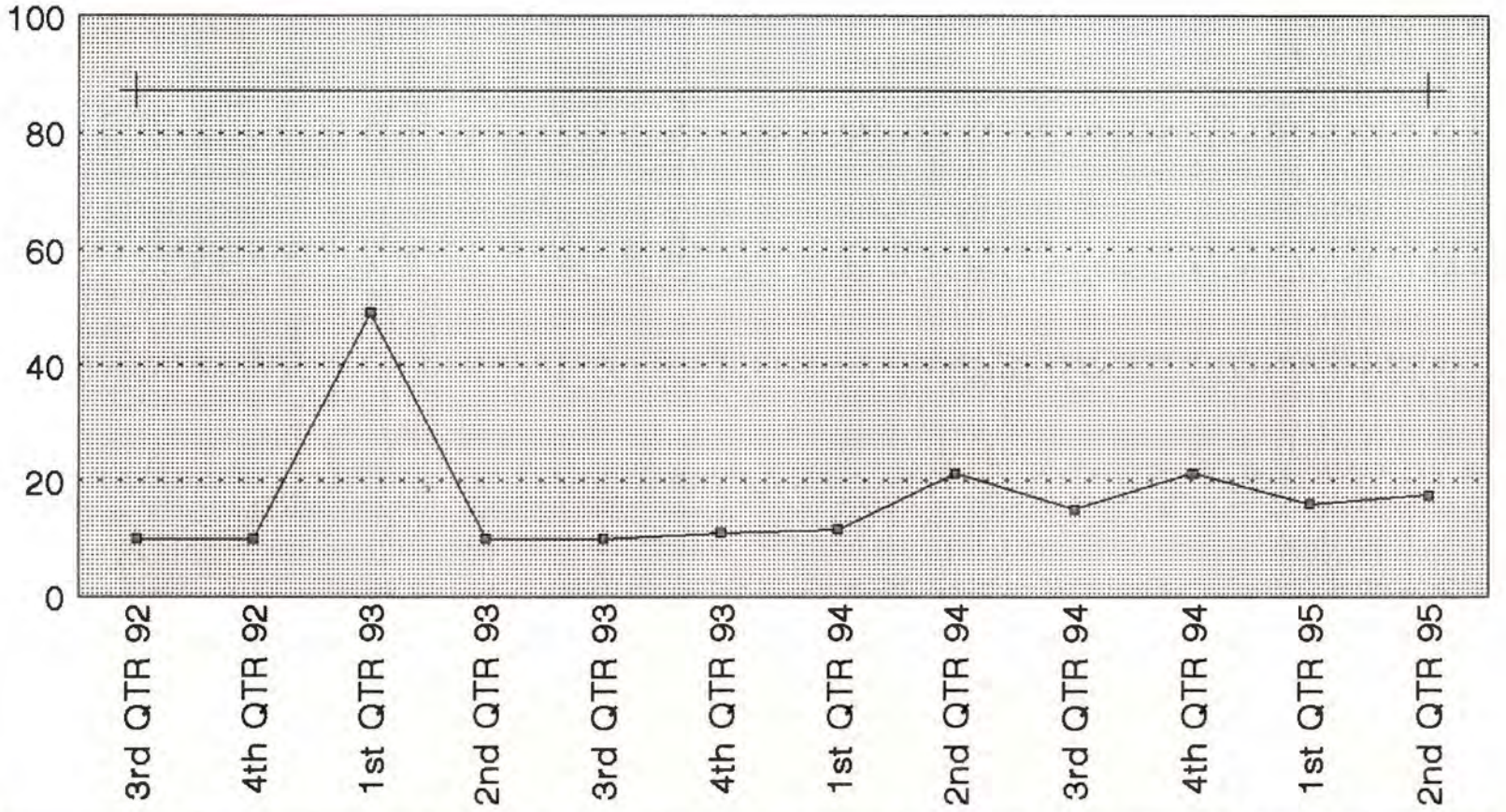
COPPER



QUARRY CORE SAMPLES (MG/KG) (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

LEAD (MG/KG)

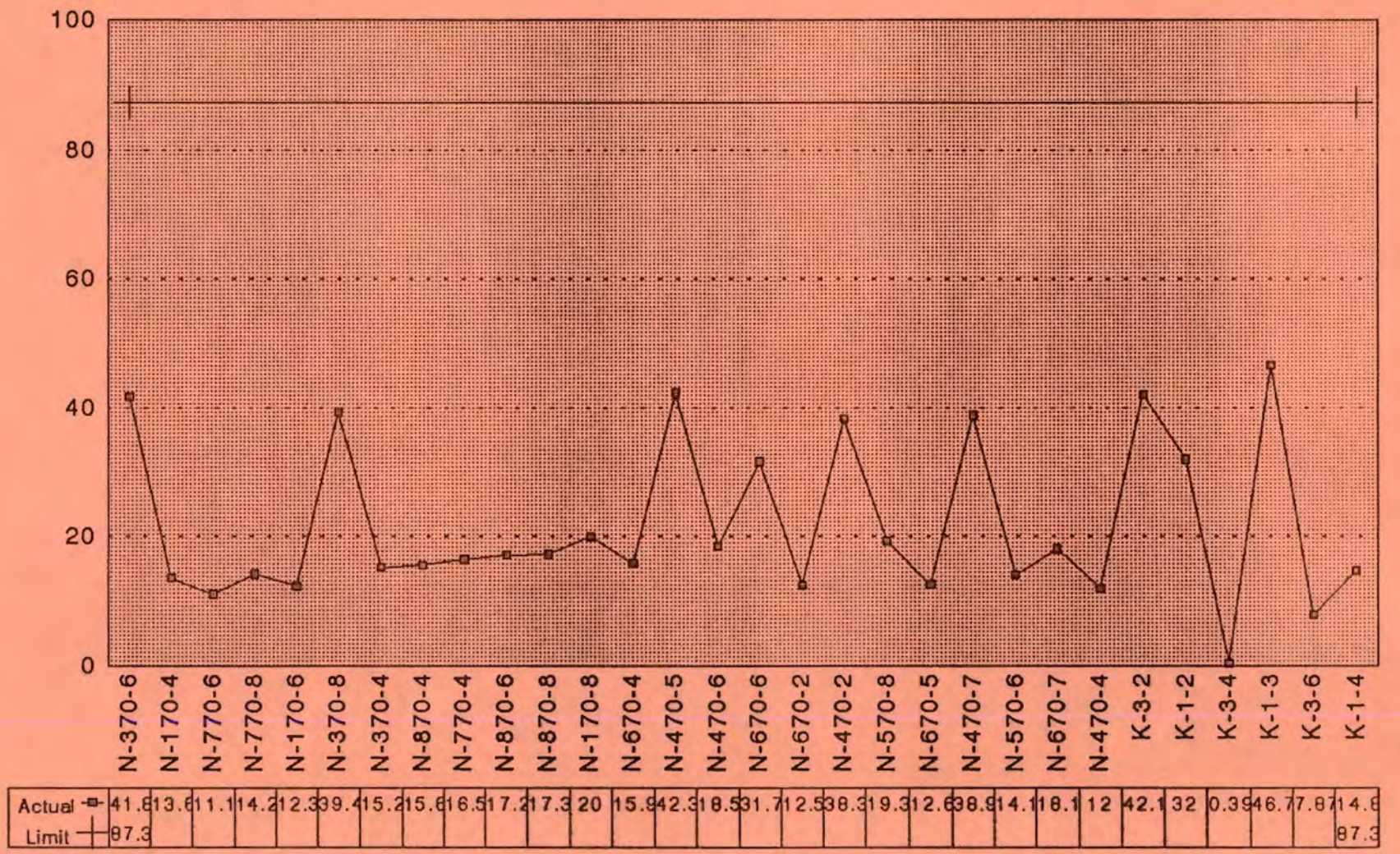


Actual	10	10	49	10	10	11	11.6	21.25	15	21.25	16	17.54
Limit	87.3											87.3

1992 TO 1995 (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

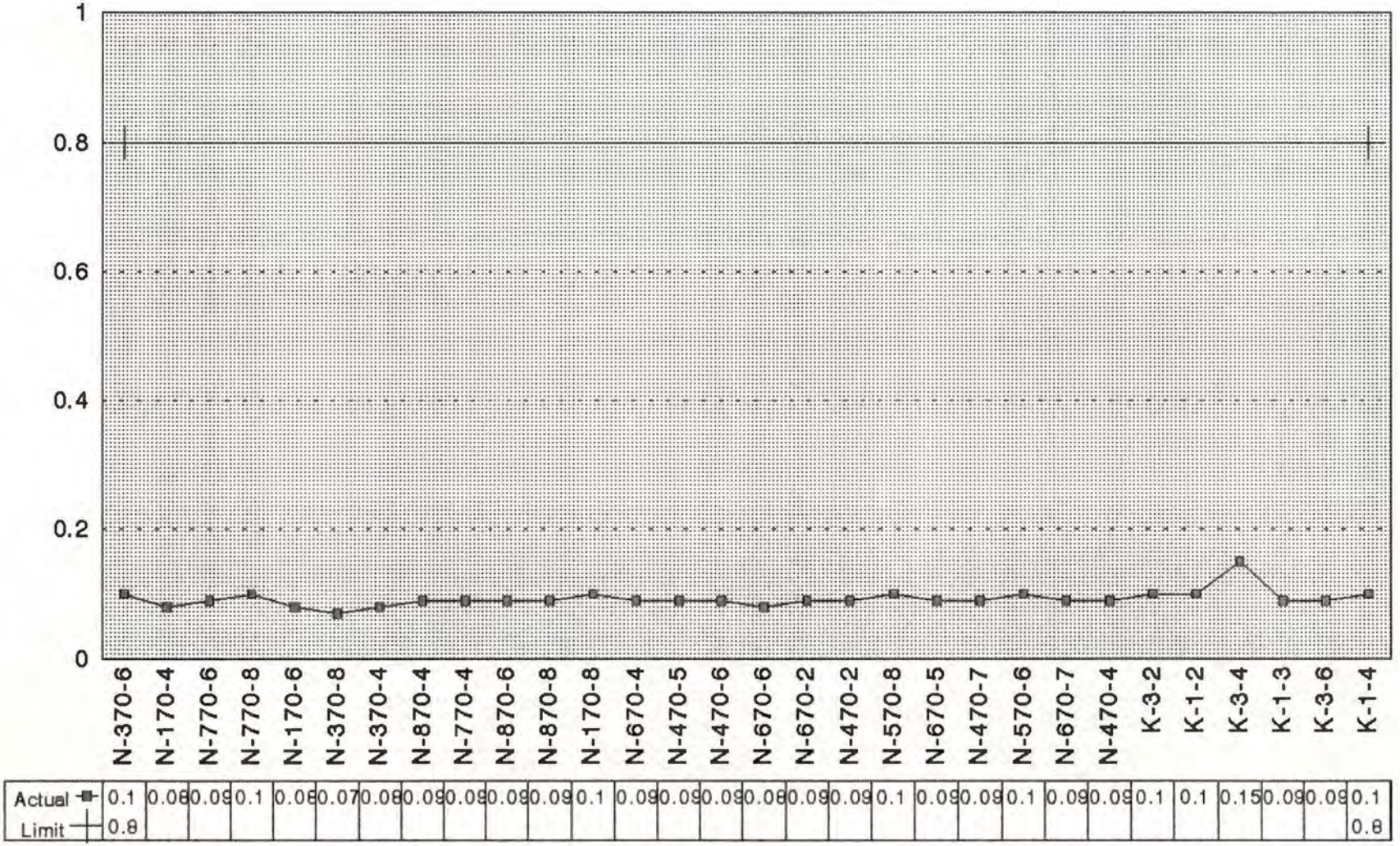
LEAD



QUARRY CORE SAMPLES (MG/KG) (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

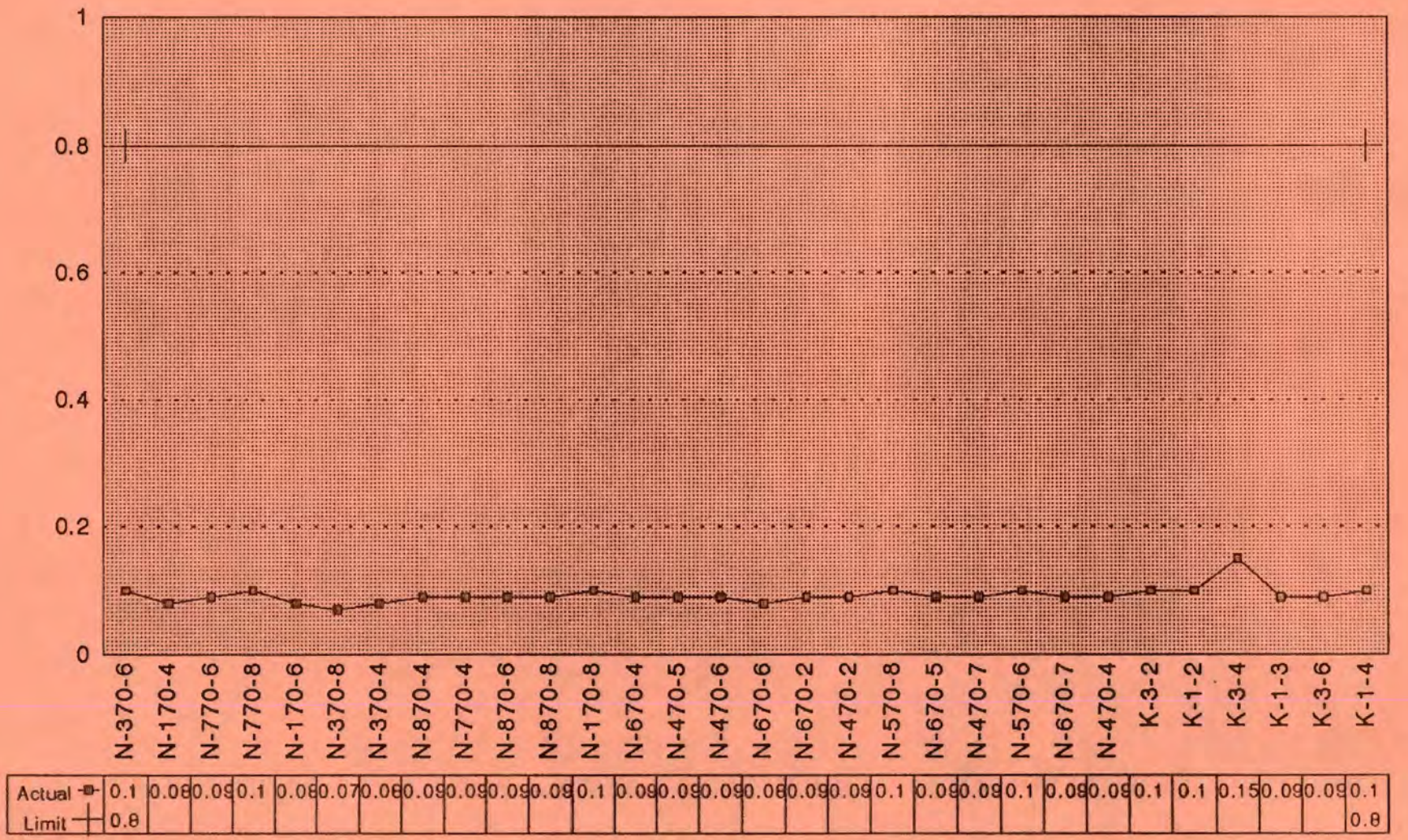
MERCURY



QUARRY CORE SAMPLES (MG/KG) (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

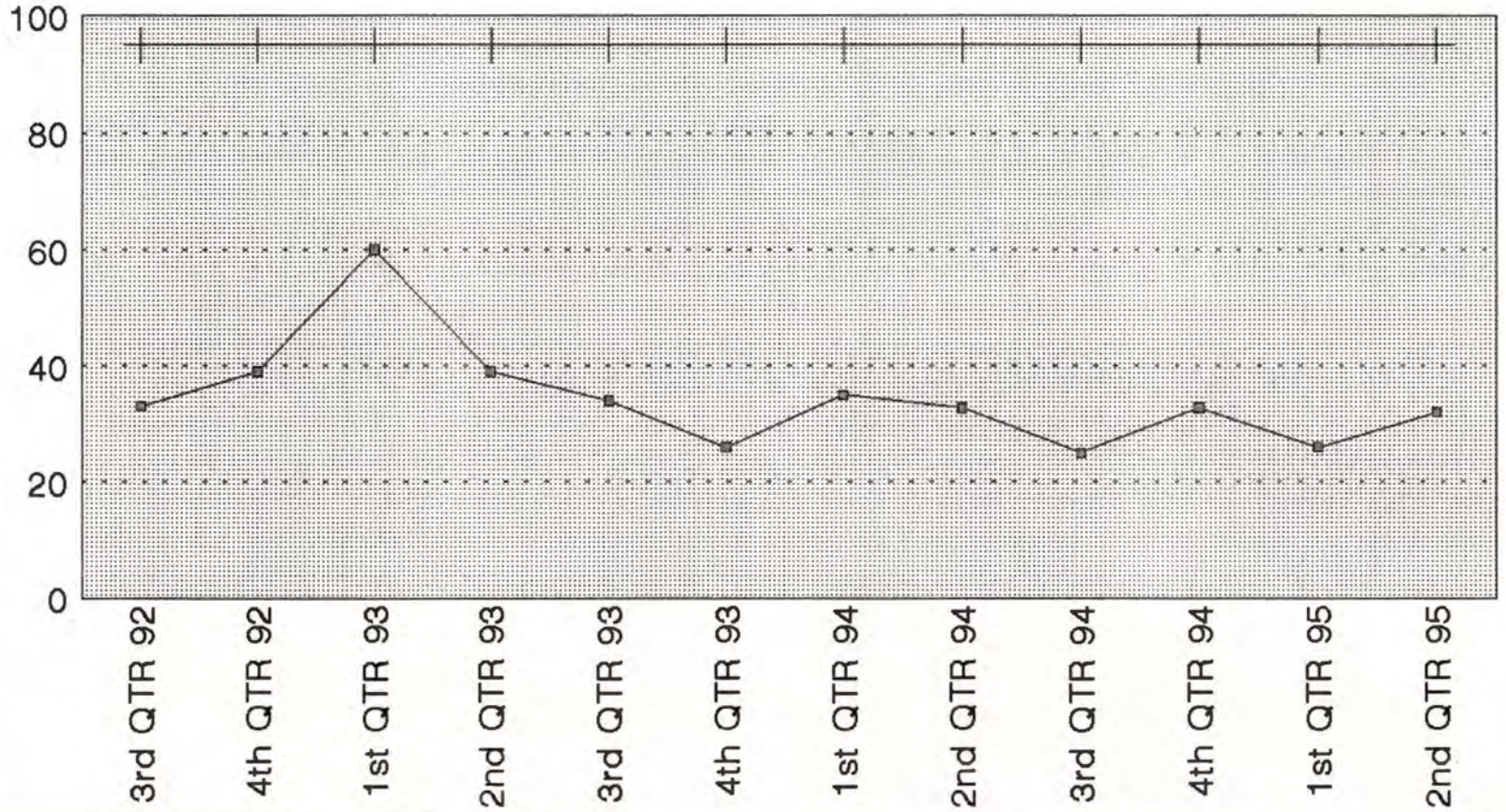
MERCURY



QUARRY CORE SAMPLES (MG/KG) (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

NICKEL(MG/KG)

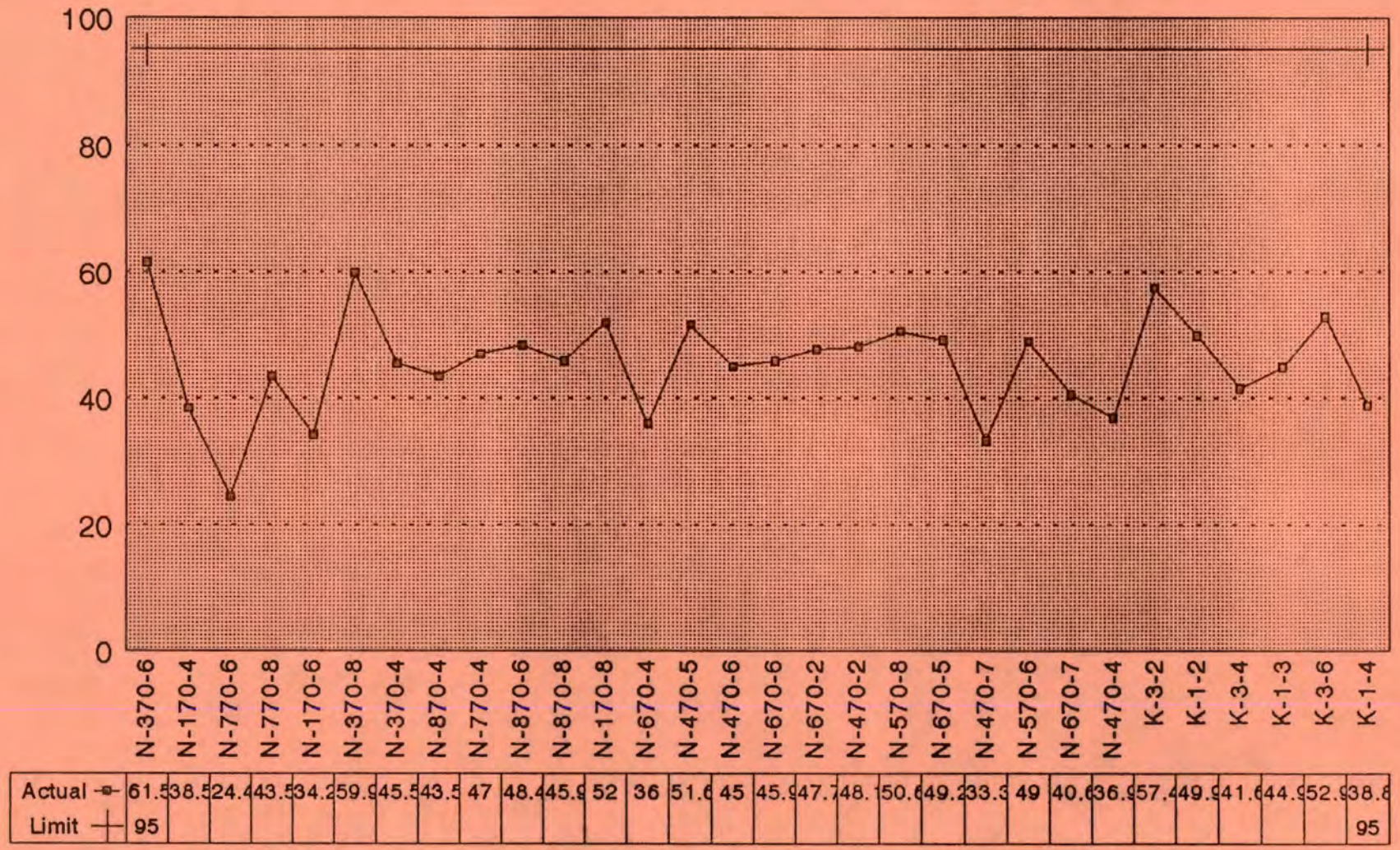


	3rd QTR 92	4th QTR 92	1st QTR 93	2nd QTR 93	3rd QTR 93	4th QTR 93	1st QTR 94	2nd QTR 94	3rd QTR 94	4th QTR 94	1st QTR 95	2nd QTR 95
Actual	33	39	60	39	34	26	35	32.75	25	32.75	26	32
Limit	95	95	95	95	95	95	95	95	95	95	95	95

1992 TO 1995 (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

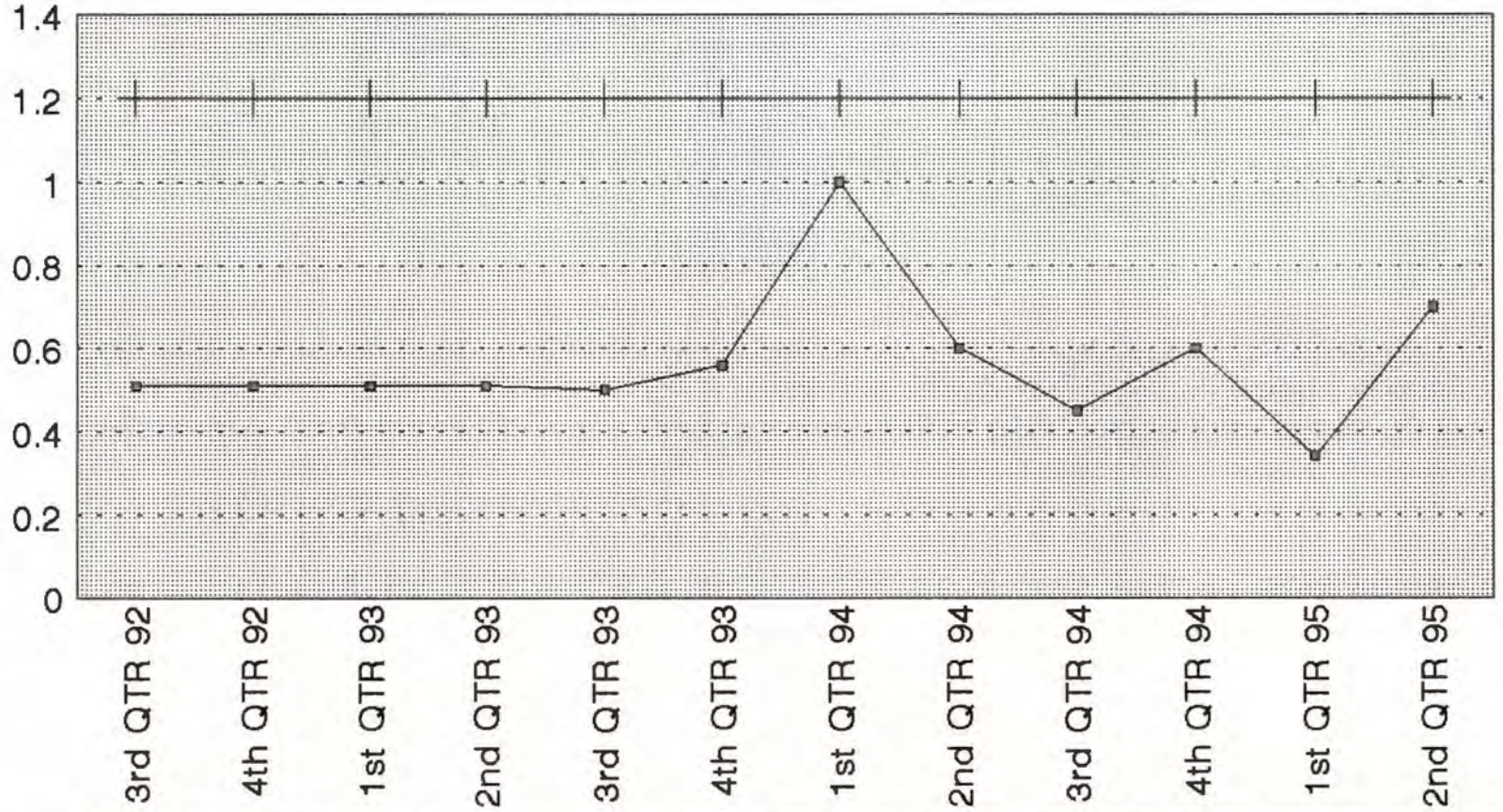
NICKEL (MG/KG)



QUARRY CORE SAMPLE (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

SELEMIUM (MG/KG)

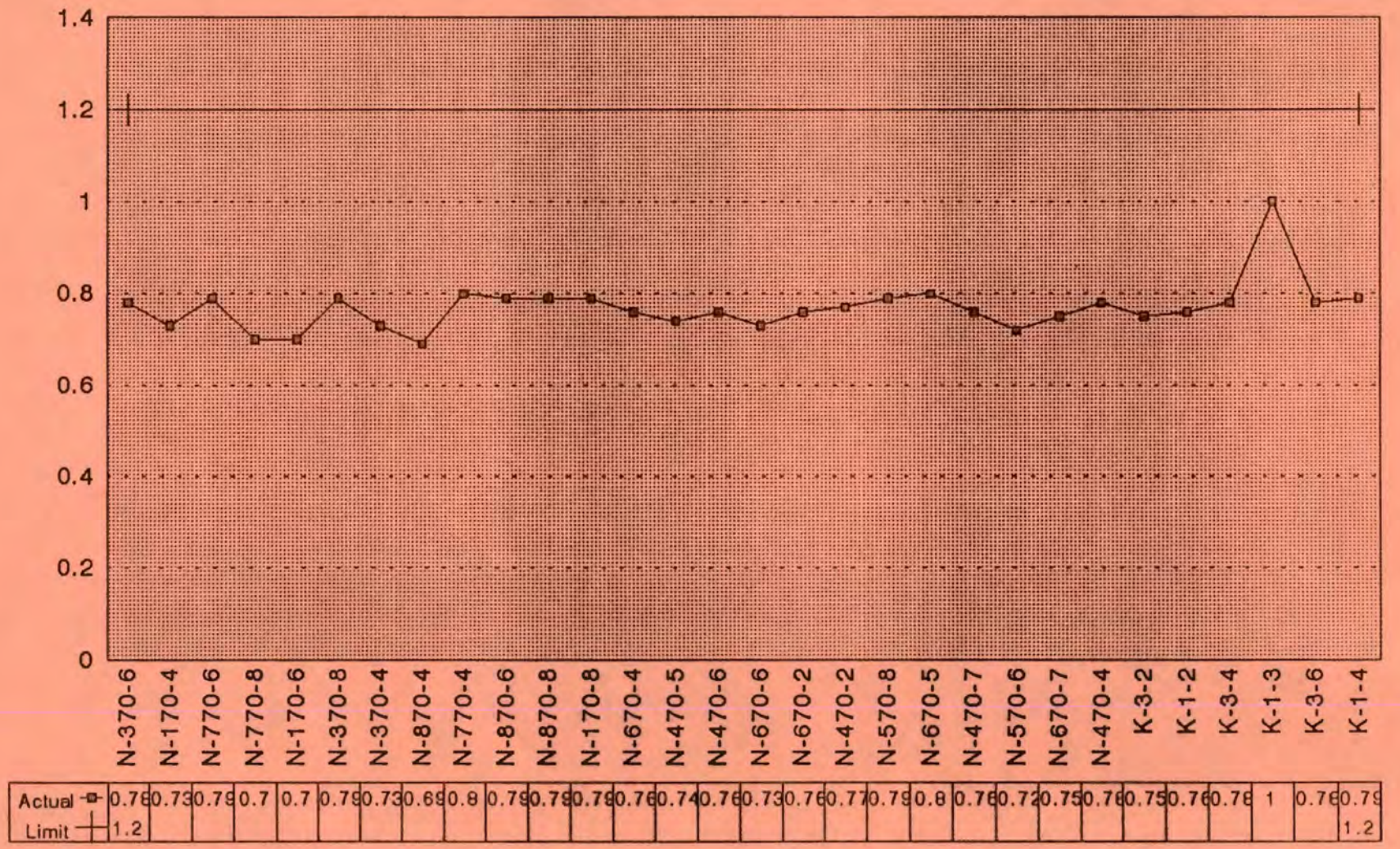


	3rd QTR 92	4th QTR 92	1st QTR 93	2nd QTR 93	3rd QTR 93	4th QTR 93	1st QTR 94	2nd QTR 94	3rd QTR 94	4th QTR 94	1st QTR 95	2nd QTR 95
Actual	0.51	0.51	0.51	0.51	0.5	0.56	1	0.6	0.45	0.6	0.34	0.7
Limit	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2

1992 TO 1995 (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

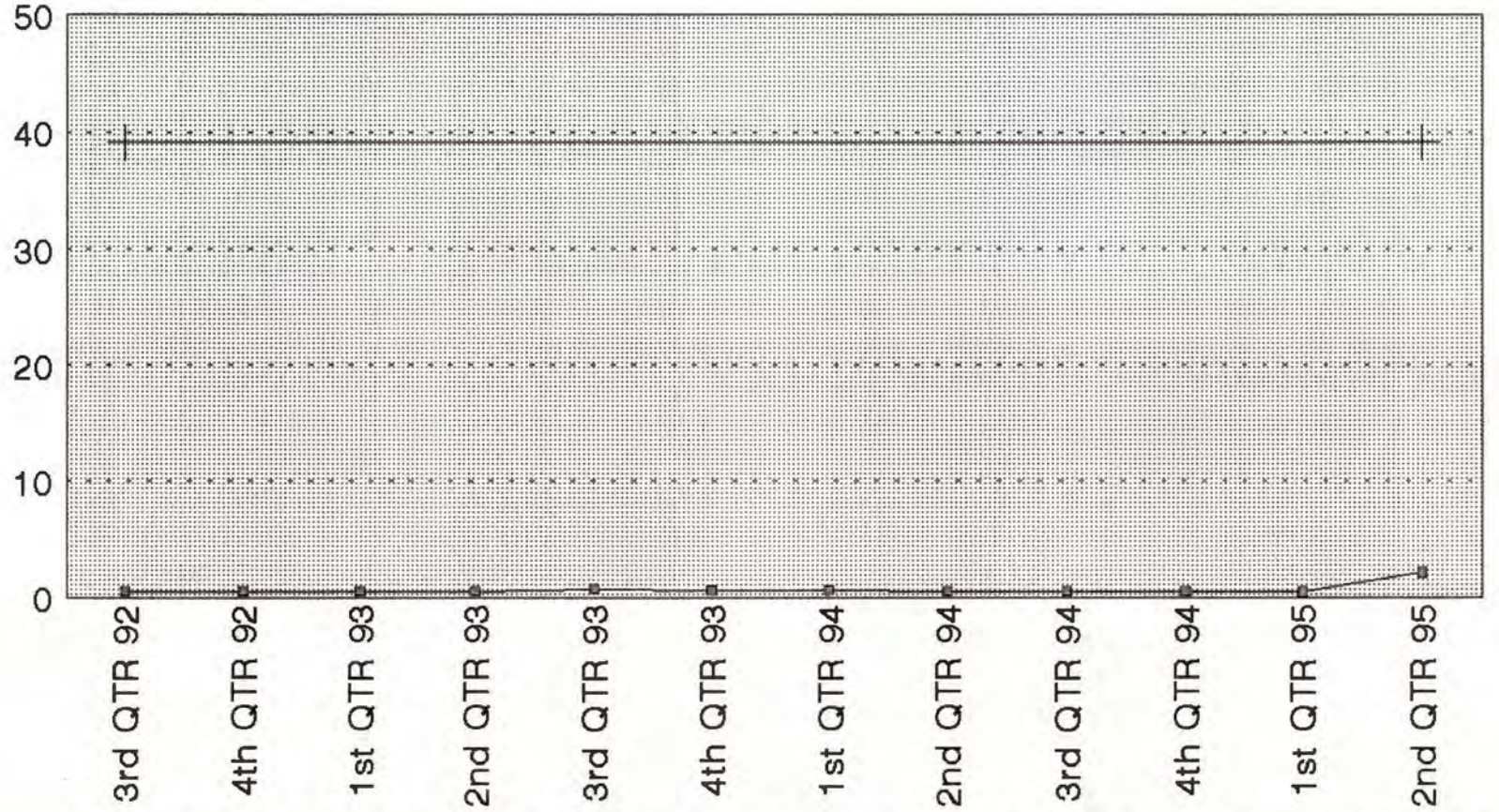
SELENIUM



QUARRY CORE SAMPLES (MG/KG) (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

SILVER (MG/KG)

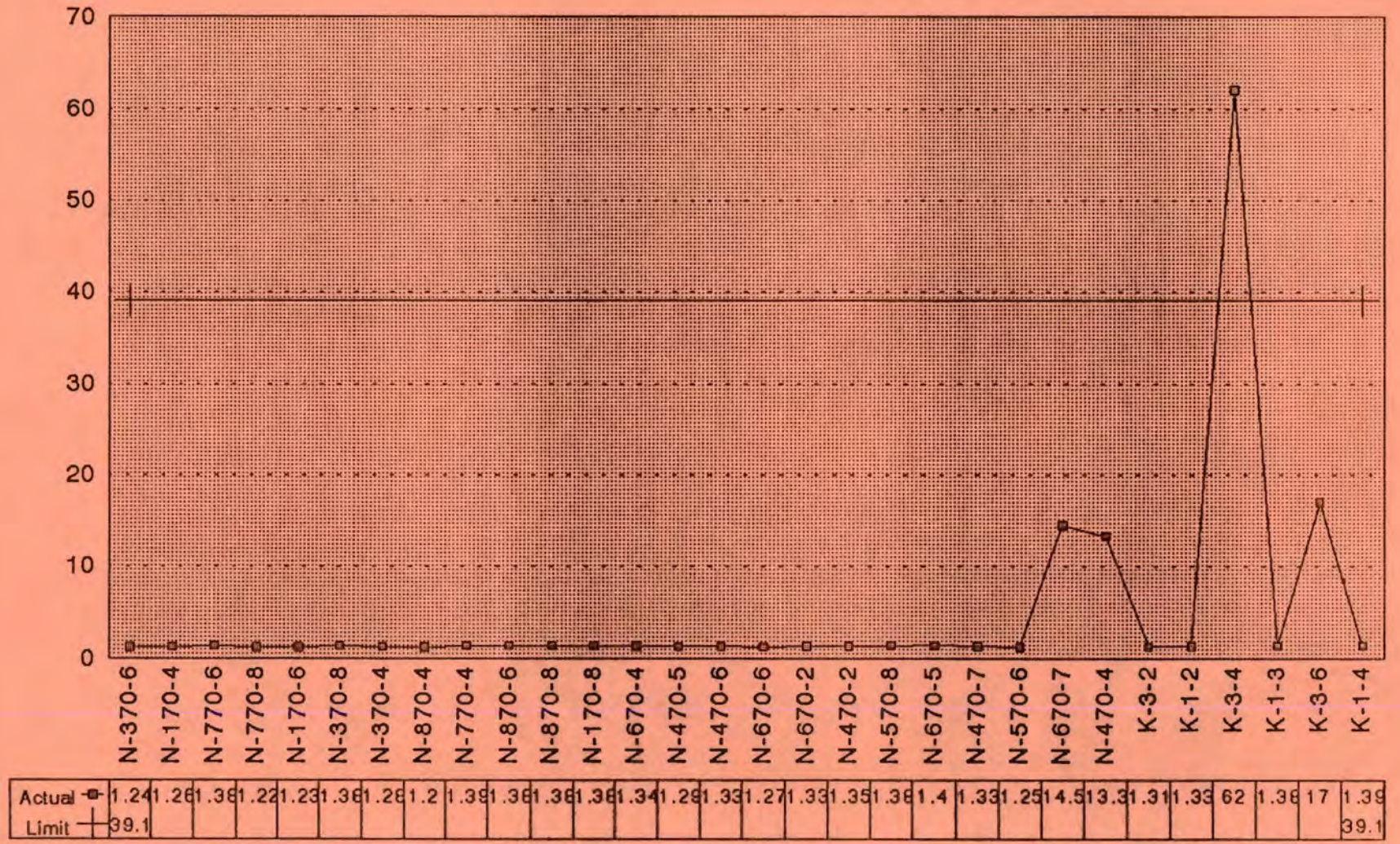


Actual	0.51	0.51	0.51	0.51	0.71	0.61	0.61	0.51	0.52	0.51	0.5	2.14
Limit	39.1											39.1

1992 TO 1995 (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

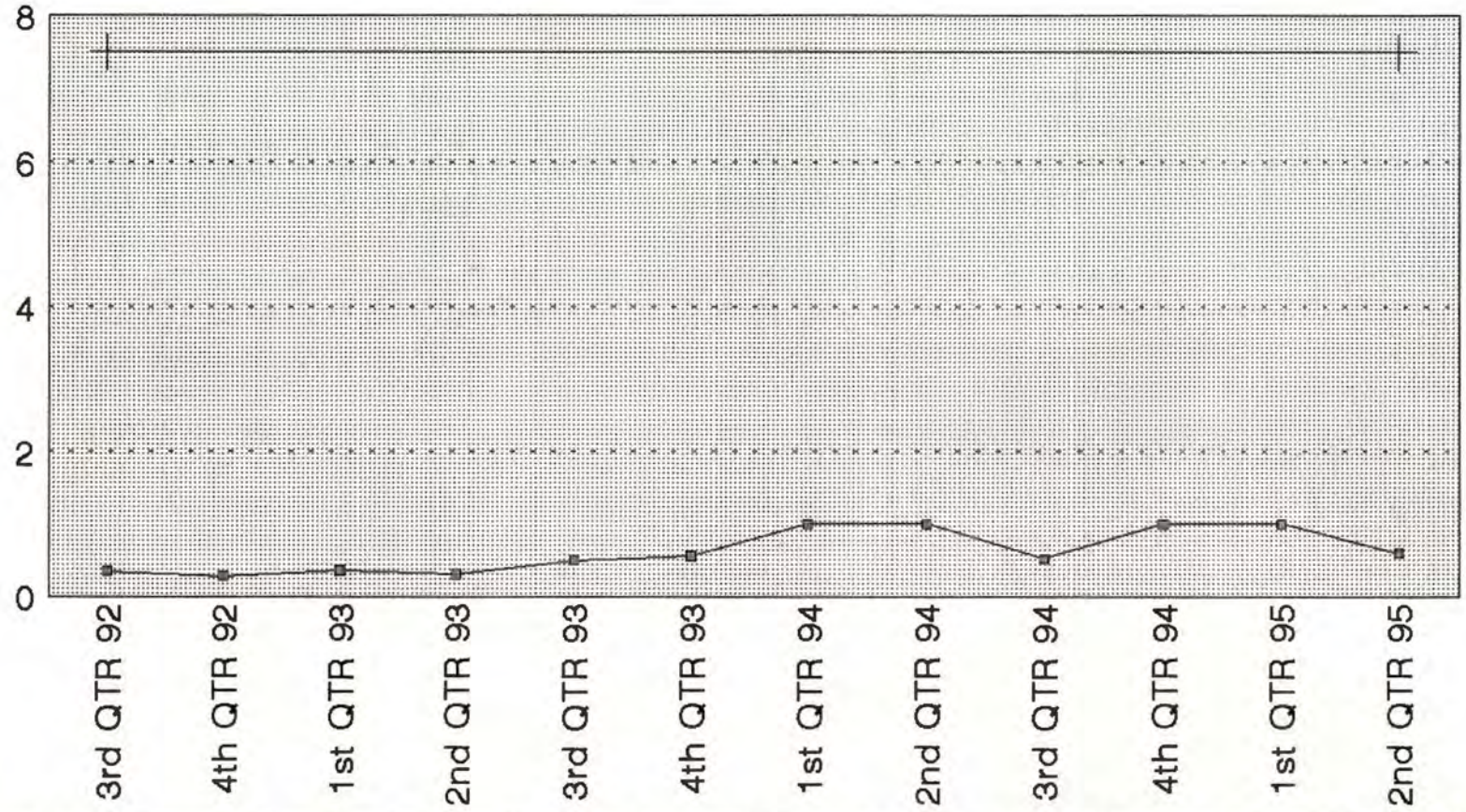
SILVER



QUARRY CORE SAMPLES (MG/KG) (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

THALLIUM (MG/KG)

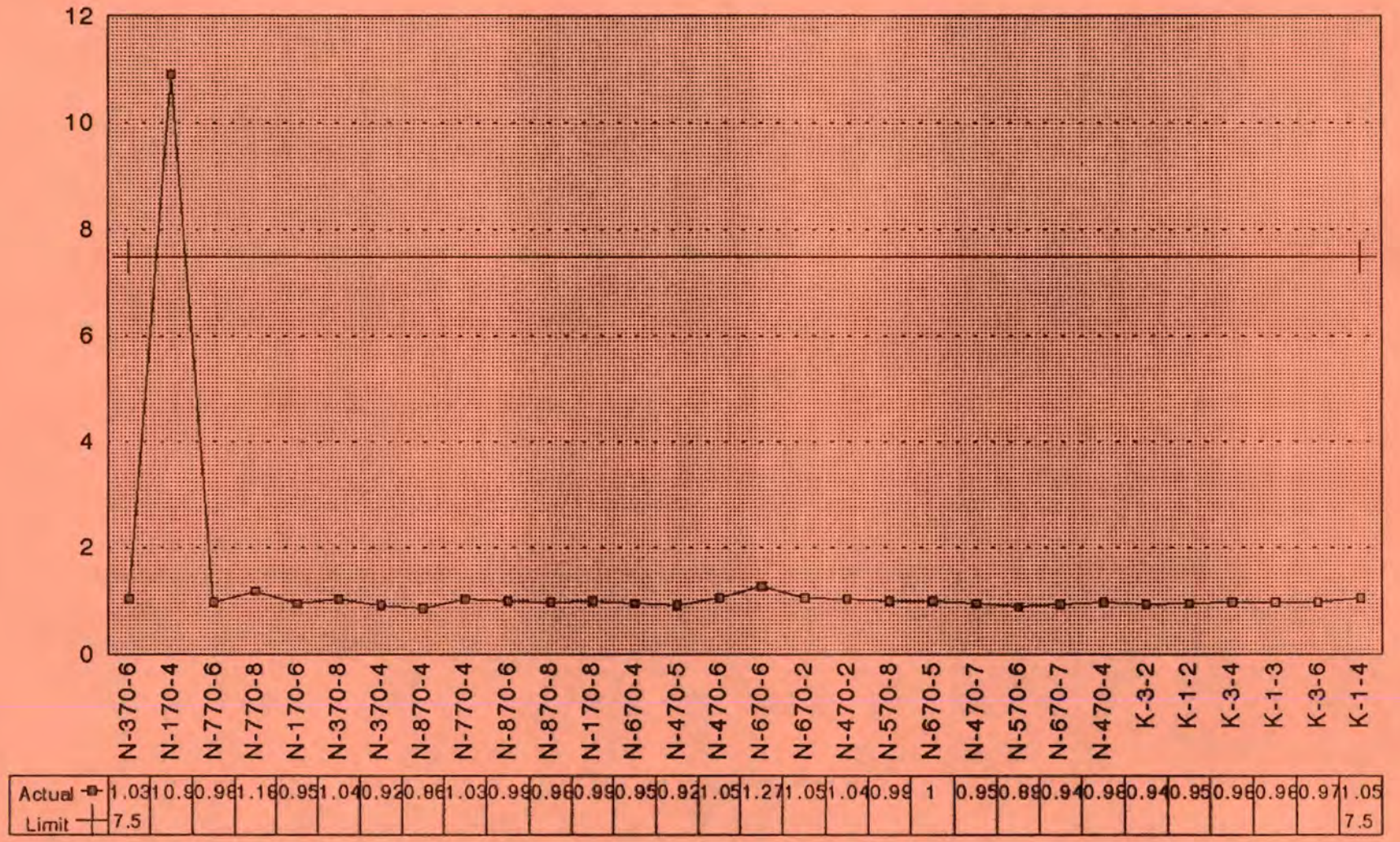


Actual	0.35	0.28	0.36	0.31	0.5	0.56	1	1	0.52	1	1	0.6
Limit	7.5											7.5

1992 TO 1995 (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

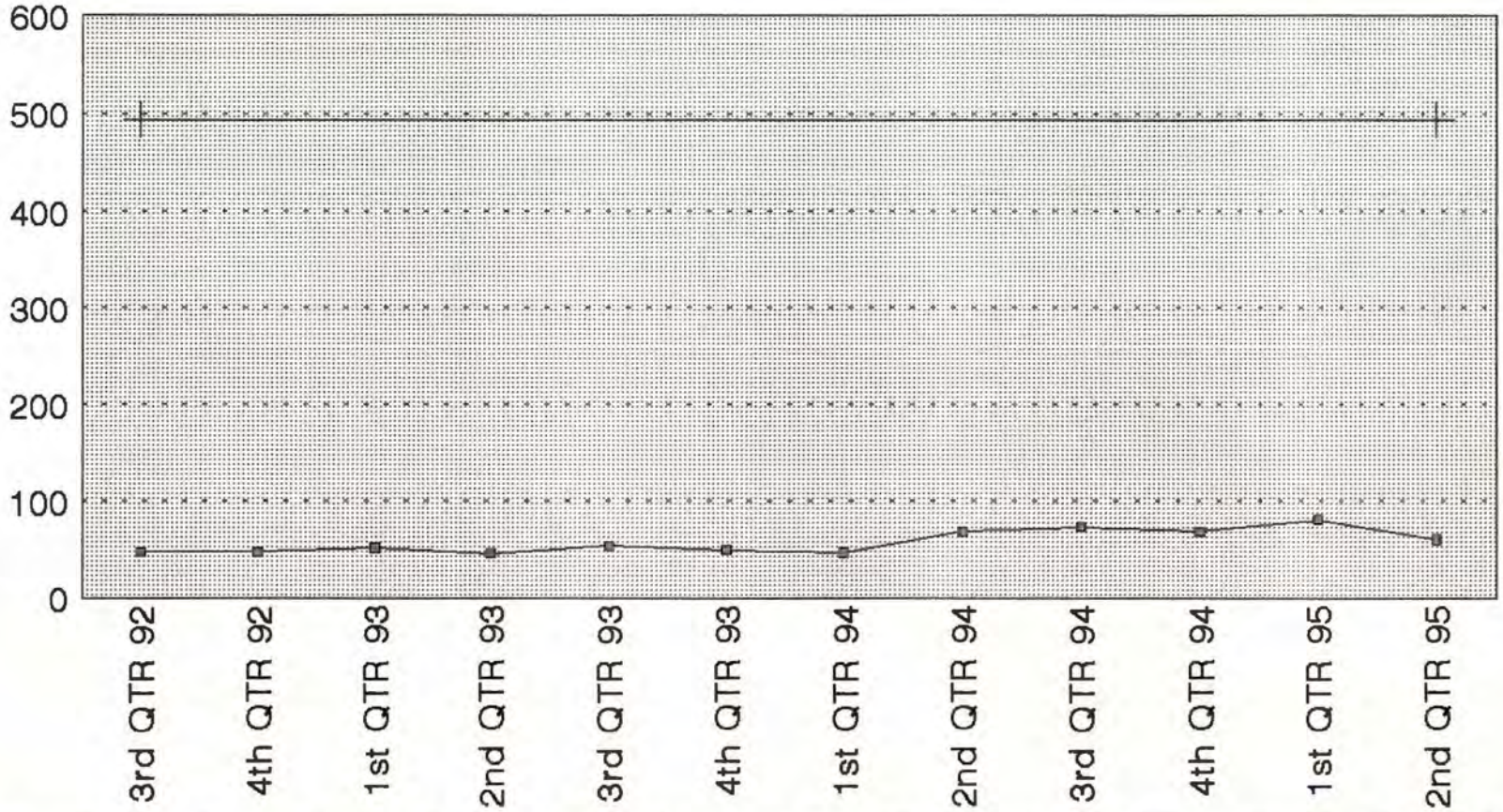
THALLIUM



QUARRY CORE SAMPLES (MG/KG) (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

ZINC (MG/KG)

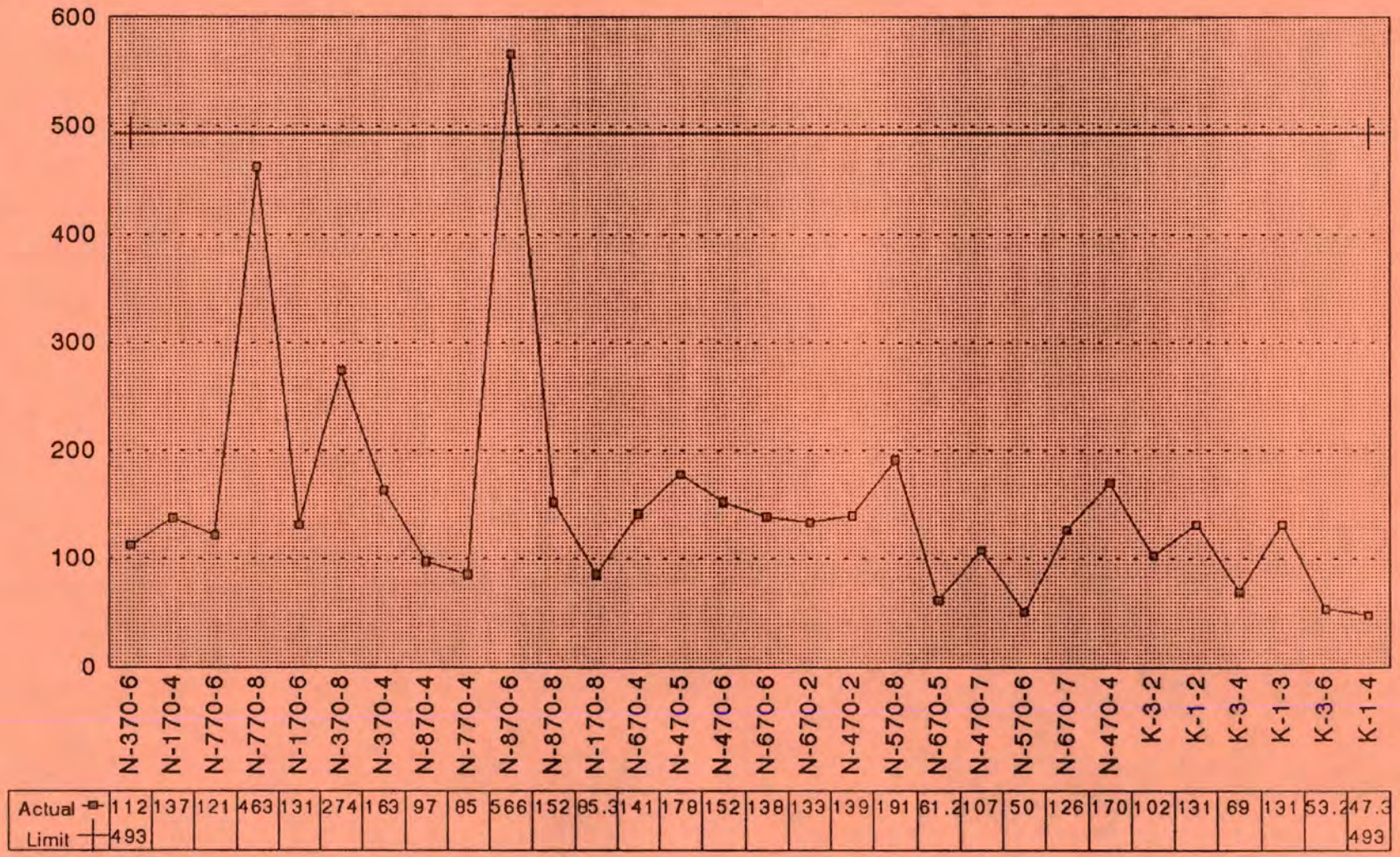


Actual	48	48	52	46	54	50	47	69	73.5	69	81	60.6
Limit	493.6											493.6

1992 TO 1995 (22T/HR)

METALS CONCENTRATIONS IN THE SHALE

ZINC



QUARRY CORE SAMPLES (MG/KG) (22T/HR)