November 3, 1993
n:psl\094

HDR

Mr. Patrick Chan
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105-3901

Subject: City of Fresno
Results of Initial Monitoring for the Lead and Copper Rule

Dear Patrick:

The intent of this letter is to transmit to you a City of Fresno Lead and Copper rule summary binder which contains the results of both rounds of the initial monitoring program, as well as the materials survey and the sampling plan. This binder includes the final results for the second round of samples that were collected in July and August.

The City of Fresno's sample results did not exceed the action level for lead or copper with the 90th percentile samples in either round of sampling.

If you have any questions concerning any of these results, please call me at (916) 939-4100.

Very truly yours,

P. Standish-Lee

Perri Standish-Lee
Vice President

PPSL/jh

Enclosure

cc: Cindy Forbes, California Dept. of Health Services (w/enclosure)
Martin McIntyre, City of Fresno
Bill Dunn, City of Fresno
Dave Murbach, HDR Engineering, Inc.

HDR Engineering, Inc.
5175 Hillsdale Circle
El Dorado Hills, California
95762-5700
Telephone
916 939-4100

August 5, 1993
07200011.012

HDR

Mr. Patrick Chan
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, California 94105-3901

Subject: **City of Fresno - Lead and Copper Rule, Preliminary Report of Second Round Monitoring Results**

Dear Patrick:

The intent of this letter is to transmit to you a preliminary summary of the tap water sample analysis results and the first set of water quality analysis results. A final report detailing these results will follow after the second round of water quality analysis is complete. The second round of samples were collected between July 20 and 22, and the results are expected near the end of August.

The City of Fresno sampled 130 of the 131 residences in their Tier 1-C sample pool for lead and copper. The one sample not collected was from a vacant residence. In addition, water quality samples were collected from 25 distribution system sites and 7 pump stations that were identified as the source water for the residences sampled. The attached technical memorandum summarizes all of these results.

If you have any questions concerning these results, please call me at 916-939-4100.

Very truly yours,

P. Standish-Lee

Perri Standish-Lee
Vice President

PPSL/jh

cc: Martin McIntyre - City of Fresno
Doug Kirk - City of Fresno
Bill Dunn - City of Fresno
Matt Bullis - City of Fresno
Cindy Forbes - California Department of Health Services
Steve Reiber - HDR Engineering, Inc.
Dave Murbach - HDR Engineering, Inc.

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5175 Hillsdale Circle
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CITY OF FRESNO, WATER DIVISION
LEAD AND COPPER RULE COMPLIANCE MONITORING
RESULTS OF INITIAL MONITORING - SECOND ROUND
TECHNICAL MEMORANDUM

TAP WATER SAMPLE RESULTS

Table 1 presents the results of the tap water analysis for lead and copper. The table lists the lead and copper concentrations in descending order. This was done in order to determine the 90th percentile levels as required by the Lead and Copper Rule.

Lead Results

The 90th percentile lead level was determined by multiplying the number of samples taken by 0.9 (130 x 0.9 = 117). The 90th percentile lead level for the City of Fresno samples is 0.008 mg/L which is below the EPA action level of 0.015 mg/L.

Copper Results

The 90th percentile copper level was determined in the same way as for lead. The 90th percentile copper level for the City of Fresno is 0.43 mg/L which is below the EPA action level of 1.3 mg/L.

DISTRIBUTION SYSTEM AND SOURCE SAMPLE RESULTS

Water quality analysis was performed on 25 distribution system locations and 7 points of entry to the distribution system. The results of this analysis are summarized in Tables 2 and 3. These results include both sets of sampling that were performed in conjunction with the first round of initial monitoring.

The lead concentration of the source water was less than 0.001 mg/L at 6 of the 7 sample locations. At W-KVDS, lead was detected in the water quality samples and reported at 0.0025 mg/L. It should be noted that the laboratory reports lead levels between 0.001 and 0.0049 mg/L as 0.0025 mg/L.

TABLE 1. TAP WATER SAMPLE ANALYSIS

Ranking		Sample No.	Lead mg/L		Sample No.	Copper mg/L
130		161	0.110		153	0.76
129		155	0.072		27	0.62
128		151	0.053		80	0.57
127		148	0.046		130	0.56
126		173	0.025		139	0.56
125		142	0.021		137	0.55
124		87	0.012		166	0.55
123		145	0.012		10	0.54
122		170	0.012		142	0.51
121		114	0.011		83	0.49
120		18	0.010		175	0.49
119		92	0.010		141	0.48
118		154	0.009		152	0.46
117	90th %	25	0.008	90th %	18	0.43
116		119	0.008		128	0.43
115		140	0.008		143	0.43
114		65	0.007		46	0.42
113		120	0.007		113	0.42
112		79	0.006		172	0.42
111		102	0.006		173	0.42
110		135	0.006		146	0.41
109		30	0.005		149	0.40
108		108	0.005		55	0.39
107		1	0.0025*		114	0.39
106		2	0.0025*		169	0.39
105		10	0.0025*		127	0.38
104		11	0.0025*		81	0.37
103		20	0.0025*		129	0.37
102		26	0.0025*		147	0.36
101		27	0.0025*		159	0.36
100		38	0.0025*		79	0.35
99		39	0.0025*		51	0.34
98		41	0.0025*		63	0.34
97		43	0.0025*		88	0.34
96		48	0.0025*		89	0.34
95		53	0.0025*		90	0.32
94		54	0.0025*		102	0.31
93		60	0.0025*		163	0.31
92		64	0.0025*		171	0.31
91		66	0.0025*		1	0.29
90		75	0.0025*		107	0.29
89		78	0.0025*		161	0.29
88		81	0.0025*		168	0.29
87		89	0.0025*		52	0.28
86		90	0.0025*		53	0.28
85		93	0.0025*		111	0.28
84		100	0.0025*		132	0.28

TABLE 1. TAP WATER SAMPLE ANALYSIS

Ranking		Sample No.	Lead mg/L		Sample No.	Copper mg/L
83		109	0.0025*		42	0.27
82		112	0.0025*		64	0.27
81		116	0.0025*		131	0.27
80		117	0.0025*		140	0.27
79		118	0.0025*		150	0.27
78		122	0.0025*		54	0.26
77		127	0.0025*		66	0.26
76		128	0.0025*		174	0.26
75		130	0.0025*		25	0.25
74		131	0.0025*		109	0.25
73		132	0.0025*		112	0.25
72		133	0.0025*		125	0.25
71		134	0.0025*		100	0.24
70		137	0.0025*		120	0.24
69		139	0.0025*		133	0.24
68		141	0.0025*		155	0.24
67		143	0.0025*		2	0.23
66		146	0.0025*		76	0.23
65		147	0.0025*		119	0.23
64		149	0.0025*		30	0.22
63		150	0.0025*		48	0.22
62		152	0.0025*		65	0.22
61		156	0.0025*		40	0.21
60		163	0.0025*		50	0.21
59		166	0.0025*		105	0.21
58		167	0.0025*		124	0.21
57		168	0.0025*		39	0.20
56		171	0.0025*		58	0.20
55		172	0.0025*		78	0.20
54		175	0.0025*		98	0.20
53		176	0.0025*		60	0.19
52		3	<0.001		71	0.19
51		4	<0.001		115	0.19
50		21	<0.001		134	0.19
49		36	<0.001		144	0.19
48		40	<0.001		151	0.19
47		42	<0.001		156	0.19
46		46	<0.001		61	0.18
45		50	<0.001		93	0.18
44		51	<0.001		136	0.18
43		52	<0.001		148	0.18
42		55	<0.001		38	0.17
41		56	<0.001		41	0.17
40		57	<0.001		69	0.17
39		58	<0.001		110	0.17
38		61	<0.001		126	0.17
37		63	<0.001		158	0.17

TABLE 1. TAP WATER SAMPLE ANALYSIS

Ranking		Sample No.	Lead mg/L		Sample No.	Copper mg/L
36		67	<0.001		170	0.17
35		69	<0.001		4	0.16
34		71	<0.001		26	0.16
33		72	<0.001		87	0.16
32		74	<0.001		108	0.16
31		76	<0.001		91	0.15
30		80	<0.001		92	0.15
29		83	<0.001		135	0.15
28		84	<0.001		36	0.14
27		86	<0.001		56	0.14
26		88	<0.001		57	0.14
25		91	<0.001		86	0.13
24		95	<0.001		118	0.13
23		98	<0.001		122	0.13
22		103	<0.001		145	0.13
21		105	<0.001		164	0.13
20		107	<0.001		67	0.12
19		110	<0.001		95	0.12
18		111	<0.001		176	0.12
17		113	<0.001		103	0.10
16		115	<0.001		84	0.10
15		123	<0.001		72	0.10
14		124	<0.001		11	0.09
13		125	<0.001		43	0.09
12		126	<0.001		75	0.08
11		129	<0.001		117	0.07
10		136	<0.001		123	0.06
9		144	<0.001		167	0.06
8		153	<0.001		165	0.05
7		157	<0.001		154	0.025**
6		158	<0.001		116	0.025**
5		159	<0.001		74	0.025**
4		164	<0.001		21	0.025**
3		165	<0.001		20	0.025**
2		169	<0.001		3	0.025**
1		174	<0.001		157	<0.01

* The laboratory reports lead values between 0.0010 and 0.0049 mg/L as 0.0025 mg/L.

** The laboratory reports copper values between 0.010 and 0.049 mg/L as 0.025 mg/L.

TABLE 2. DISTRIBUTION SYSTEM WATER QUALITY ANALYSIS

Sample No.	Samples Taken 6/23/93 - 7/1/93				
	Alkalinity (mg/L CaCO3)	Calcium (mg/L)	pH	Temp. (deg C)	Cond. (mS/cm)
D-31	140	29	7.26	26.1	0.35
D-34	120	29	7.68	28.6	0.30
D-36	110	26	7.51	25.8	0.30
D-66	75	16	7.47	25.4	0.21
D-68	170	44	7.13	24.9	0.47
D-69	160	38	7.03	26.7	0.47
D-70	120	28	7.12	29.7	0.28
D-76	91	21	7.30	24.5	0.23
D-79	130	28	7.43	26.5	0.27
D-81	110	26	7.24	29.7	0.29
D-82	110	26	7.34	25.6	0.28
D-116	110	29	7.03	25.8	0.36
D-117	130	29	7.32	28.1	0.31
D-126	99	24	7.74	23.9	0.29
D-128	110	21	7.21	26.2	0.27
D-129	120	27	7.25	25.8	0.28
D-130	110	24	7.28	25.2	0.26
D-133	99	22	7.45	25.4	0.25
D-134	93	21	7.50	26.7	0.23
D-155	110	24	7.23	29.7	0.25
D-156	110	21	7.20	29.5	0.28
D-158	120	30	7.16	27.8	0.35
D-159	130	29	7.22	25.7	0.37
D-181	120	27	7.32	26.6	0.31
D-202	77	20	7.68	22.8	0.23
Average	115	26	7.32	26.5	0.30
Minimum	75	16	7.03	22.8	0.21
Maximum	170	44	7.74	29.7	0.47

TABLE 3. SOURCE WATER QUALITY ANALYSIS

Sample No.	Samples Taken 6/23/93 - 7/1/93						
	Lead (mg/L)	Copper (mg/L)	Alkalinity (mg/L CaCO3)	Calcium (mg/L)	pH	Temp. (deg C)	Cond. (mS/cm)
W-79	<0.001	<0.01	120	27	7.43	26.5	0.27
W-86	NS	NS	NS	NS	NS	NS	NS
W-91	<0.001	<0.01	97	23	7.63	22.3	0.27
W-97	<0.001	<0.01	120	27	7.36	22.9	0.30
W-99	<0.001	0.025*	85	18	7.53	22.1	0.27
W-131	<0.001	<0.01	95	21	7.42	24.4	0.26
W-140	<0.001	<0.01	110	31	7.12	23.4	0.36
W-KVDS	0.0025**	0.025*	110	26	7.46	23.3	0.28
Average	0.0012	0.014	105	25	7.42	23.6	0.29
Minimum	<0.001	<0.01	85	18	7.12	22.1	0.26
Maximum	0.0025**	0.025*	120	31	7.63	26.5	0.36

NS = No sample taken because pump was out of service. With this pump out of service, W-131 is the source for the area served by W-86.

* The laboratory reports copper values between 0.010 and 0.049 mg/L as 0.025 mg/L.
** The laboratory reports lead values between 0.0010 and 0.0049 mg/L as 0.0025 mg/L.

June 2,1993
07200011.010

HDR

Mr. Patrick Chan
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, California 94105-3901

Subject: City of Fresno - Lead and Copper Rule, First Round Monitoring Results - Preliminary Report.

Dear Patrick:

The intent of this letter is to transmit to you a summary of the results of the tap water sample analysis and the first set of source and distribution system water quality analysis. A final report detailing the results will follow after the results for the second round of water quality sampling are received. These results are expected by the middle of June.

The City of Fresno sampled tap water from 131 homes for lead and copper. All the homes were from a Tier 1-C sample pool. In addition to the above sampling, water quality samples were collected from 25 distribution system sites and eight pump stations identified as the source water for the residences sampled. The attached technical memorandum summarizes these results.

The City of Fresno will be conducting the second round of the initial tap water and water quality monitoring in late June 1993.

If you have any questions concerning these results please call me.

Very Truly Yours,

Dave Murbach
for Perri Standish-Lee
Vice President

cc: Martin McIntyre - City of Fresno
Doug Kirk - City of Fresno
Bill Dunn - City of Fresno
Matt Bullis - City of Fresno
Cindy Forbes - California Department of Health Services
Steve Reiber - HDR Engineering, Inc.
Dave Murbach - HDR Engineering, Inc.

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5175 Hillsdale Circle
El Dorado Hills, California
95762-5700
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916 939-4100

TECHNICAL MEMORANDUM
CITY OF FRESNO
LEAD AND COPPER RULE COMPLIANCE MONITORING
PRELIMINARY RESULTS OF INITIAL MONITORING - FIRST ROUND

The City of Fresno collected their first round of initial monitoring samples in compliance with the Lead and Copper Rule during April and May, 1993.

TAP WATER SAMPLE RESULTS

Table 1 presents the results of the tap water analysis for lead and copper. The City of Fresno sampled 131 single family residences that comprised a Tier 1-C sample pool. The table lists the lead and copper concentrations in descending order. This was done in order to determine the 90th percentile levels as required by the Lead and Copper Rule.

Lead Results

The 90th percentile lead level was determined by multiplying the number of samples taken by 0.9 (131 x 0.9 = 117.9). The 90th percentile lead level for the City of Fresno samples is 0.0025 mg/L which is below the EPA action level of 0.015 mg/L. It should be noted that the laboratory reports all analyzed lead values between 0.0010 and 0.0049 mg/L as 0.0025 mg/L.

Copper Results

The 90th percentile copper level was determined in the same way as for lead. The 90th percentile copper level for the City of Fresno is 0.43 mg/L which is below the EPA action level of 1.3 mg/L.

DISTRIBUTION SYSTEM AND POINT OF ENTRY SAMPLE RESULTS

Water quality analysis was performed on 25 distribution system locations and 8 points of entry to the distribution system. The results of this analysis are summarized in Tables 2 and 3. These results are the first set of two sets of sampling that will be performed in conjunction with the first round of initial monitoring.

The lead concentration of the source water was less than 0.001 mg/L at all sample locations.

FOLLOW-UP MONITORING

To comply with the requirements of the Lead and Copper Rule a second round must be conducted to complete the initial monitoring period. This second round of sampling will begin during the last week of June 1993.

TABLE 1. TAP WATER SAMPLE ANALYSIS

Ranking		Sample No.	Lead mg/L		Sample No.	Copper mg/L
131		169	0.037		153	0.74
130		154	0.011		159	0.60
129		157	0.008		18	0.56
128		10	0.007		54	0.53
127		18	0.006		174	0.52
126		151	0.006		137	0.51
125		90	0.005		156	0.51
124		1	0.0025*		175	0.51
123		2	0.0025*		21	0.50
122		3	0.0025*		128	0.48
121		11	0.0025*		1	0.47
120		41	0.0025*		166	0.47
119		48	0.0025*		171	0.45
118	90th %	53	0.0025*	90th %	80	0.43
117		54	0.0025*		151	0.43
116		60	0.0025*		146	0.42
115		64	0.0025*		152	0.42
114		65	0.0025*		53	0.39
113		72	0.0025*		72	0.39
112		81	0.0025*		20	0.38
111		93	0.0025*		83	0.38
110		95	0.0025*		176	0.38
109		102	0.0025*		133	0.37
108		109	0.0025*		67	0.36
107		110	0.0025*		132	0.36
106		113	0.0025*		150	0.36
105		114	0.0025*		169	0.36
104		117	0.0025*		27	0.35
103		118	0.0025*		81	0.35
102		119	0.0025*		90	0.35
101		129	0.0025*		141	0.35
100		130	0.0025*		145	0.35
99		132	0.0025*		161	0.34
98		134	0.0025*		41	0.33
97		135	0.0025*		46	0.33
96		136	0.0025*		142	0.33
95		137	0.0025*		10	0.32
94		140	0.0025*		95	0.32
93		141	0.0025*		113	0.32
92		152	0.0025*		130	0.32
91		155	0.0025*		168	0.32
90		163	0.0025*		26	0.31
89		166	0.0025*		148	0.31
88		168	0.0025*		88	0.30
87		170	0.0025*		93	0.30
86		171	0.0025*		42	0.28
85		172	0.0025*		48	0.28

TABLE 1. TAP WATER SAMPLE ANALYSIS

Ranking		Sample No.	Lead mg/L		Sample No.	Copper mg/L
84		173	0.0025*		11	0.27
83		174	0.0025*		65	0.26
82		175	0.0025*		107	0.26
81		176	0.0025*		120	0.26
80		4	< 0.001		2	0.25
79		20	< 0.001		30	0.25
78		21	< 0.001		64	0.25
77		25	< 0.001		115	0.25
76		26	< 0.001		149	0.25
75		27	< 0.001		163	0.25
74		30	< 0.001		165	0.25
73		36	< 0.001		79	0.24
72		38	< 0.001		75	0.23
71		39	< 0.001		102	0.23
70		40	< 0.001		114	0.23
69		42	< 0.001		51	0.22
68		43	< 0.001		62	0.22
67		46	< 0.001		39	0.21
66		50	< 0.001		63	0.21
65		51	< 0.001		124	0.21
64		52	< 0.001		109	0.20
63		55	< 0.001		55	0.19
62		56	< 0.001		76	0.19
61		57	< 0.001		100	0.19
60		58	< 0.001		119	0.19
59		61	< 0.001		131	0.19
58		62	< 0.001		136	0.19
57		63	< 0.001		170	0.19
56		66	< 0.001		71	0.18
55		67	< 0.001		78	0.18
54		69	< 0.001		112	0.18
53		71	< 0.001		4	0.17
52		74	< 0.001		40	0.17
51		75	< 0.001		50	0.17
50		76	< 0.001		89	0.17
49		78	< 0.001		110	0.17
48		79	< 0.001		143	0.17
47		80	< 0.001		164	0.17
46		83	< 0.001		25	0.16
45		84	< 0.001		125	0.16
44		86	< 0.001		38	0.15
43		87	< 0.001		157	0.15
42		88	< 0.001		173	0.15
41		89	< 0.001		56	0.14
40		91	< 0.001		58	0.14
39		92	< 0.001		66	0.14
38		98	< 0.001		87	0.14

TABLE 1. TAP WATER SAMPLE ANALYSIS

Ranking		Sample No.	Lead mg/L		Sample No.	Copper mg/L
37		100	< 0.001		118	0.14
36		103	< 0.001		167	0.14
35		105	< 0.001		91	0.13
34		107	< 0.001		105	0.13
33		108	< 0.001		108	0.13
32		111	< 0.001		122	0.13
31		112	< 0.001		3	0.12
30		115	< 0.001		98	0.12
29		116	< 0.001		129	0.12
28		120	< 0.001		139	0.12
27		122	< 0.001		172	0.12
26		123	< 0.001		43	0.11
25		124	< 0.001		135	0.11
24		125	< 0.001		57	0.10
23		126	< 0.001		60	0.10
22		127	< 0.001		92	0.10
21		128	< 0.001		116	0.10
20		131	< 0.001		144	0.10
19		133	< 0.001		36	0.09
18		139	< 0.001		61	0.09
17		142	< 0.001		111	0.09
16		143	< 0.001		127	0.09
15		144	< 0.001		86	0.08
14		145	< 0.001		155	0.08
13		146	< 0.001		126	0.07
12		147	< 0.001		134	0.07
11		148	< 0.001		147	0.07
10		149	< 0.001		103	0.06
9		150	< 0.001		117	0.06
8		153	< 0.001		123	0.06
7		156	< 0.001		52	0.025**
6		158	< 0.001		69	0.025**
5		159	< 0.001		74	0.025**
4		161	< 0.001		84	0.025**
3		164	< 0.001		140	0.025**
2		165	< 0.001		158	0.025**
1		167	< 0.001		154	<0.01

* The laboratory reports lead values between 0.0010 and 0.0049 mg/L as 0.0025 mg/L.

** The laboratory reports copper values between 0.010 and 0.049 mg/L as 0.025 mg/L.

TABLE 2. DISTRIBUTION SYSTEM WATER QUALITY ANALYSIS

Sample No.	Alkalinity (mg/L CaCO3)	Calcium (mg/L)	Field Analysis					
			pH	Temp. (deg C)	Cond. (mS/cm)	Date Sampled	Time Sampled	Sampler
D-31	140	29	7.19	22.4	0.34	5/3/93	12:30	JAM
D-34	120	26	7.58	22.7	0.29	4/30/93	14:55	JAM
D-36	110	27	7.44	22.8	0.30	4/30/93	15:15	JAM
D-66	91	18	7.48	20.8	0.20	4/29/93	10:45	JAM
D-68	160	37	7.15	21.8	0.38	4/29/93	12:30	JAM
D-69	140	35	7.22	23.6	0.35	4/30/93	14:00	JAM
D-70	93	20	7.56	21.5	0.23	4/29/93	15:10	JAM
D-76	110	22	7.56	20.6	0.25	5/4/93	9:25	JAM
D-79	97	23	7.54	22.1	0.26	5/3/93	10:55	JAM
D-81	110	28	7.38	23.5	0.31	5/3/93	10:05	JAM
D-82	110	26	7.63	22.8	0.28	5/3/93	15:45	JAM
D-116	140	34	7.22	24.3	0.33	5/3/93	14:20	JAM
D-117	130	33	7.39	23.6	0.32	5/3/93	15:00	JAM
D-126	79	17	7.55	22.5	0.19	4/29/93	9:55	JAM
D-128	170	35	7.10	22.5	0.36	5/3/93	13:00	JAM
D-129	110	27	7.33	25.4	0.31	5/3/93	9:17	JAM
D-130	110	23	7.41	22.4	0.27	5/3/93	11:15	JAM
D-133	120	25	7.47	21.0	0.28	4/22/93	11:10	DMM
D-134	110	26	7.46	23.8	0.28	4/30/93	15:40	JAM
D-155	81	17	7.44	23.4	0.21	4/29/93	13:15	JAM
D-156	130	25	7.27	23.2	0.29	5/3/93	14:45	JAM
D-158	120	25	7.37	24.0	0.29	5/3/93	14:00	JAM
D-159	130	26	7.17	23.5	0.31	4/29/93	15:25	JAM
D-181	120	27	7.44	22.9	0.32	5/3/93	9:45	JAM
D-202	120	28	7.34	23.0	0.31	5/3/93	9:30	JAM

Average	116	26	7.43	22.2	0.29
Minimum	91	18	7.15	20.6	0.20
Maximum	160	37	7.63	23.6	0.38

TABLE 3. SOURCE WATER QUALITY ANALYSIS

Sample No.	Lead (mg/L)	Copper (mg/L)	Alkalinity (mg/L CaCO3)	Calcium (mg/L)	Field Analysis					
					pH	Temp. (deg C)	Cond. (mS/cm)	Date Sampled	Time Sampled	Sampler
W-79	<0.001	<0.01	130	28	7.43	23.1	0.30	5/3/93	10:20	JAM
W-86	<0.001	<0.01	130	30	7.30	23.1	0.31	4/29/93	14:50	JAM
W-91	<0.001	<0.01	99	23	7.74	21.4	0.26	5/3/93	10:35	JAM
W-97	<0.001	<0.01	110	27	7.32	21.9	0.30	5/3/93	9:05	JAM
W-99	<0.001	0.025*	89	17	7.57	21.5	0.21	4/22/93	10:45	DMM
W-131	<0.001	<0.01	97	19	7.41	24.0	0.23	4/29/93	11:15	JAM
W-140	<0.001	<0.01	110	31	7.15	31.8	0.35	4/28/93	13:55	JAM
W-KVDS	<0.001	<0.01	79	16	7.62	22.5	0.20	4/29/93	10:17	JAM
Average	<0.001	0.003	106	24	7.44	23.7	0.27			
Minimum	<0.001	<0.01	79	16	7.15	21.4	0.20			
Maximum	<0.001	0.025*	130	31	7.74	31.8	0.35			

* The laboratory reports copper values between 0.010 and 0.049 mg/L as 0.025 mg/L.

April 6, 1993
07200011.007

HDR

Mr. Patrick Chunn
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105-3901

Subject: City of Fresno - Lead and Copper Rule
Technical Memo

Dear Patrick:

The City of Fresno will be initiating their first round of Lead and Copper Monitoring the week of April 13, 1993. We are planning to complete the first set of tap sampling, distribution system water quality sampling, and source water lead and copper sampling by April 30, 1993.

The material survey was impeded because of difficulties encountered in obtaining records on plumbing materials. However, we now have 98 volunteers which are being screened and a second letter to additional homes constructed between 1982 and 1987 was sent out April 2, 1993.

The attached technical memo summarizes our progress to date and our approach to the sample collection. A final list of tap sample sites will be sent to you as soon as it becomes available.

If you have any questions concerning the City's program please contact me at (916) 939-4100.

Very truly yours,

P. Standish-Lee

Perri Standish-Lee
Vice President

PSL/jh

Attachment

cc: Martin McIntyre
Bill Dunn
Doug Kirk

HDR Engineering, Inc.

5175 Hillsdale Circle
El Dorado Hills, California
95762-5700

Telephone
916 939-4100

LEAD AND COPPER RULE MONITORING

TECHNICAL MEMO

The U.S. Environmental Protection Agency (EPA) promulgated National Primary Drinking Water Regulations for lead and copper on June 7, 1991 (56 FR 26460). Three monitoring protocols are included in the final Lead and Copper Rule:

1. Tap water monitoring for lead and copper
2. Water quality parameter (WQP) monitoring
3. Source water monitoring for lead and copper

The City of Fresno retained HDR Engineering, Inc. to:

- Conduct the material survey and sampling plan
- Assist with sample collection
- Assess the water quality monitoring results

The purpose of this technical memo is to present the results of the material survey and sample site recruitment activities. Included in this memo are samples of documents used, detailed information on the sites recruited to date, a list of sites for distribution water quality samples and a list of wells for source water quality monitoring.

For purposes of the Lead and Copper Rule, the City of Fresno is classified as a large city. At this time the City reports 97,000 service hook-ups and serves a population of 400,000.

Tap Water Monitoring

The EPA-mandated tap water monitoring program is intended to determine the lead and copper concentrations in drinking water to which the public may be exposed. It is also to be

used as a measure of the effectiveness of corrosion control treatment for reducing the concentrations of these contaminants.

The tap water monitoring protocol for lead and copper was designed to identify the sources and measure the concentration of lead and copper corrosion by-products in drinking water. It focuses on first-draw standing water samples from the taps of those homes identified as being at greatest risk from lead contamination. Contributing lead sources may include:

- Lead service lines (largely absent in the Fresno system)
- Lead and copper interior piping
- Lead solder
- Lead bearing brass alloys

According to the EPA, tap water monitoring for lead and copper will allow the water systems to determine the lead and copper concentrations in drinking water to which their customers may be exposed, as well as the effectiveness of corrosion control treatment for reducing concentrations of those contaminants in water consumed by the public.

To satisfy the requirements of the Rule, the City of Fresno is required to collect one hundred (100) tap water samples for lead and copper analyses.

Water Quality Parameter Monitoring

Water quality parameter (WQP) samples are required for large systems. Twenty-five (25) samples (in replicate) need to be taken during each six-month monitoring period. Parameters for testing include pH, alkalinity, calcium, conductivity, water temperature and orthophosphate or silica, if an inhibitor is used. The City of Fresno does not use inhibitors at this time. These parameters are used to determine the corrosive character of the water and provide a baseline for monitoring the effectiveness of any potential corrosion control treatment.

Because of the limited amount of time available in Fresno's monitoring period, it was decided to do WQP sampling at the same time that lead and copper tap samples are being collected.

WQP samples will be collected at:

- Each point of entry of water to the distribution system. Only wells operating during the sampling period and feeding the selected neighborhoods will be tested.

- Various sample station sites representative of water quality throughout the distribution system in the areas where tap water monitoring is conducted.

The purpose of sampling both locations is to characterize water quality variation with time of travel throughout the system. If there are large variations in the values, this could indicate a lack of chemical stability and point to the need for a treatment adjustment to stabilize water quality.

Lead and Copper in the Source Water

The source water for a large-sized system is to be tested for lead and copper. Two samples are to be collected at each entry point during each of two consecutive 6-month monitoring periods. This is to determine what proportion of the drinking water lead is contributed through the corrosion of plumbing materials, and what proportion originates in the source water.

Because of time constraints, samples will be collected from the wells at the same time as the tap sampling occurs.

Residential Lead and Copper Sampling Pool

EPA stipulates that utilities collect tap water samples from residences most likely to have lead problems. The targeting criteria for tap selection is as follows:

Tier I: Single Family Residences (SFRs) with lead soldered copper pipe installed after 1982; or interior lead piping; or serviced by a lead service line.

Tier II: Multiple Family Residences (MRFs) or public or commercial buildings (BLDGs) with lead soldered copper pipe installed after 1982; or interior lead piping or serviced by a lead service line.

Tier III: SFRs with lead soldered copper pipe installed prior to 1983.

The State of California implemented the lead ban. The effective date was July 1, 1986 (Health and Safety Code, SB164 Sections 300.6 and 300.7). Therefore, we have targeted homes constructed between 1982 and 1987 for Tier I sampling.

According to water department records and long-time water department employees, the City of Fresno has no known lead service line, the few that were installed have been replaced as the City found them. Hence, it was not possible to satisfy the Tier I-A or Tier I-B sampling criteria suggested by EPA.

Tier I-C locations (single-family residences with copper pipes soldered with lead containing solder constructed after 1982 and before 1987) make up the bulk of the sampling sites. Some Tier II locations (multi-family residences and businesses with copper pipes soldered with lead containing solder constructed in the same era) were located and included in the sampling sites.

Location of Testing Sites

The City Building Department records did not contain information regarding plumbing materials. To collect information on homes constructed between 1982 and 1987 and where copper plumbing was used, the following actions were taken:

- Contractors were contacted by phone, four subdivisions were located, and a first set of letters with a return stamped postcard were sent on March 16, 1993.

- Plumbers were interviewed - none would admit to using copper pipe.

- A press release was issued on February 23, 1993 (Exhibit 3). Announcements were made by City staff on local TV and radio stations on February 16, 23, 25 and March 8, 1993. As a result, the City received 19 responses and eight (8) Tier I-C volunteers.

- A second record search was conducted in the subdivisions where homes of the volunteers were located and a second mailing with a return stamped postcard were sent on April 2 and April 5. We expect to start receiving responses the week of April 5, 1993.

From the first 481 letters (Exhibits 1 and 2) 77 replies have been received to date. This is a reply rate of 16%. Of the homes responding six (6) had softeners and had to be eliminated as possible sampling sites. City staff inspected a majority of these homes and found that 55 are acceptable for sampling.

The information about the sampling sites is given in Table 1. All the sites located to date are Tier I-C. Two city employees volunteered as well.

Residential Plumbing Inspection

All sites chosen will be inspected for presence of copper plumbing when sampling kits are delivered. The presence of lead tin solder will be confirmed in 10 to 15% of the sites by a chemical test on a small scraping of solder (Lead in Solder Test Kit, LaMotte Company).

Sample Collection and Analysis

The sample collection procedures will follow all EPA guidelines in the Lead and Copper Rule. Some of the important sampling criteria include:

- The sample must be collected from a kitchen or bathroom tap.
- Water must stand in the pipes for at least six hours before the sample is collected.
- The sample must be a first-draw collection.
- The sample must be one liter in volume.

After again ascertaining that a home has copper plumbing, the resident will be instructed in taking the sample and given a sample kit containing a sample bottle, written directions, and a custody form to sign (Exhibit 4). The resident will then collect the sample and leave the sample bottle outside of their home for pick-up the next morning. HDR and City of Fresno staff will do sample collection where it can be coordinated with the home owner and city employees.

The samples will be picked up by HDR Engineering and City employees, cataloged, and delivered to BSK Laboratories, Inc. (a state certified laboratory) for analysis of lead and copper. Samples will not be acidified until they had been received at the laboratory.

Each of the residents participating will be sent the results of the testing from their own home along with the overall results.

EXHIBIT 1

City of
FRESNO

Public Works Department

Water Division • 209 498-1412
1910 East University Street • Fresno, California 93703-2988

Resident
Fresno, CA

Dear Resident:

The City of Fresno is beginning a sampling program to test drinking water for lead and copper. The Environmental Protection Agency and the State of California recently issued regulations limiting the maximum allowable concentrations of lead and copper in the water we drink. Lead and copper enters drinking water primarily through the corrosion of household plumbing materials. The results of the test will tell us whether additional actions are necessary to protect your health and to comply with the new Federal and State regulations.

The regulations require that samples be collected from homes built prior to July 1, 1986 and plumbed with copper pipe or homes with lead service lines. According to our records, your home may be acceptable for this testing program. We would greatly appreciate your voluntary cooperation in these important tests. If you agree to participate, we will need to collect two samples from you. One sample will be taken in April and the other in June 1993.

The sample collection should not be a major inconvenience. Your participation in this testing program will involve filling a laboratory bottle from the kitchen or bathroom sink first thing in the morning or right when you come home from work. The idea is to collect water which has been standing in the pipes six to eight hours and has been exposed to lead solder joints and faucets during that time. A sample bottle and complete instructions will be delivered to your home. After you have collected your sample, the bottle should be placed outside in a location where we can pick it up and not disturb your morning schedule. Test results from your home, as well as conclusions, from the testing program will be made available to you.

Because the City is planning on collecting the first sample on April 1993, you will need to return the enclosed reply card as soon as possible if you wish to be placed on the list of homes to be tested this year. The City may also attempt to telephone you about volunteering for the sampling program.

If you have any questions about the program or have lost your volunteer reply card, please contact Bill Dunn or Jeff Murray of the City of Fresno Water Division at 498-4136. Your participation in this sampling program will help assure the health and safety of our community.

Sincerely,

Martin McIntyre
Water Production Supervisor
City of Fresno

MRM/jam
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EXHIBIT 2

FRESNO WATER SAMPLING SURVEY	
Name:	
Address:	
Fresno, CA	Zip:
Home phone:	
Work phone:	
When is the best time to contact you?	
Do you have copper plumbing?	
Is this a one-family residence?	
Do you have a water softener?	

Thank you for your willingness to participate in our Water Sampling Survey.
Your assistance will help us protect the community's health and safety. We will be contacting you soon.

EXHIBIT 3

FOR IMMEDIATE RELEASE:

CITY OF FRESNO TO TEST FOR LEAD IN DRINKING WATER SEEKS VOLUNTEERS FOR SURVEY

The City of Fresno will be testing homes for lead and copper as part of the Safe Drinking Water Act requirements. Homes to be targeted for testing are those built between 1982 and 1987 with lead soldered copper plumbing and homes with lead service lines. Testing is voluntary on the part of the consumer and done at the expense of the City of Fresno Water Division.

Fresno's well water is well below permissible lead levels, however, because lead and copper most commonly enter drinking water supplies through corrosion of home plumbing materials, water samples must be collected from the consumer's tap. This means that a sample is best collected first thing in the morning or right after arriving home from work.

The action level (the concentration at which public water suppliers need to initiate corrosion control procedures) is 0.015 milligrams per liter for lead and 1.3 milligrams per liter for copper. The water to be tested must have at least six hours contact with the pipes before collection.

The City is required to test tap samples for lead twice this year.

We need volunteers to provide tap water samples from inside their homes. Results of this sample program will determine if plumbing material corrosion poses a health risk in our community. The City will provide instructions, sample containers, and results of the program upon its completion. If you are interested in helping us with this program please call Jeff Murray 498-1458 (City of Fresno Water Divison).

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EXHIBIT 4

DIRECTIONS
RESIDENT TAP SAMPLE COLLECTION PROCEDURES

These samples are being collected to determine the contribution of faucet fixtures and household pipes and/or solder to the lead and copper levels in tap water. This sampling effort is required by the Environmental Protection Agency, and is being accomplished through the cooperation of homeowners and residents.

The collection procedure is described in detail below. Prior arrangements will be made with you to coordinate the sample collection event. Dates will be set for sample kit delivery and pick-up by water department staff.

1. Do not use any water for 6-8 hours before sampling. The water department recommends that either early mornings or evenings upon returning home from work are the best sampling times to ensure that the necessary stagnant water conditions exist.

2. A kitchen or bathroom cold-water faucet is to be used for sampling. Place the open sample bottle below the faucet and gently open the cold water tap. Slowly fill the sample bottle to the base of the neck and turn off the water. It should take about 45 seconds to fill the bottle.

3. Tightly cap the sample bottle and place in the plastic bag provided. Fill in the information requested on the form below, sign the form, and place in the plastic bag along with the sample bottle. Please review the address label below at this time to ensure that all information contained on the label is correct.

4. Place the sample outside your home for pick-up.

5. Results from this monitoring effort will be provided to participating customers when reports are generated for the State unless excessive lead and/or copper levels are found. In those cases, immediate notification will be provided.

Call Bill Dunn at 498-4136 if you have any questions regarding these instructions.

_____

TO BE COMPLETED BY RESIDENT:

PLEASE RETURN WITH SAMPLE.

Water was last used: TIME:_____ DATE: _____

Sample was collected: TIME:_____ DATE: _____

I have read the above directions and have taken a tap sample in accordance with these directions.

Signature_____ DATE: _____

Name: _____

Address: _____

_____

TO BE COMPLETED BY THE WATER DEPARTMENT EMPLOYEE:

Sample picked up by:_____ DATE:_____

April 30, 1993
07200011.009

HDR

Mr. Patrick Chan
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105-3901

Subject: City of Fresno - Lead and Copper Rule Sampling Plan

Dear Patrick:

The City of Fresno initiated their first round of lead and copper monitoring the week of April 19, 1992.

Our material survey concluded that no Tier I-A, or Tier I-B sites could be located in the City of Fresno Service Area. We therefore included in the sampling pool Tier I-C sites only. The first round of samples will include 130 homes. Table 1 is a list of the homes sampled. The City identified eight wells, Table 2, which serve the areas sampled. These wells were sampled and will be analyzed for: lead, copper, pH, conductivity, calcium, alkalinity and temperature.

In addition, twenty five distribution system sampling sites, Table 3, were identified in and around the homes participating in the study for water quality monitoring. These stations were sampled and will be analyzed for: pH, conductivity, calcium, alkalinity and temperature.

Source water quality and distribution system quality will be sampled again in mid-May to comply with the Lead and Copper Rule monitoring requirements.

The City will initiate the second round of sampling the last week of June. We should have all the samples to the laboratory by July 11, 1993. A copy of our sample plan is included for your review.

As soon as we receive the results from the laboratory, we will prepare a report which summarizes the results. A copy of the report will be sent to you and to the California Department of Health Services.

HDR Engineering, Inc.

5175 Hillsdale Circle
El Dorado Hills, California
95762-5700

Telephone
916 939-4100

If for some reason the sampling plan does not meet with your satisfaction or you have any coments about our sampling plan, please contact me as soon as possible, so we can make the necessary changes.

Very truly yours,

Perri Standish-Lee

Perri Standish-Lee
Vice President

PSL/af

cc: Martin McIntyre
Bill Dunn
Doug Kirk
Matt Bullis
Cindy Forbes

TABLE 2. Fresno Lead and Copper Rule Source Sample Locations

Pump Station Number	Address	Location	Associated Tap Sample Numbers
91	(b) (9) [redacted]		1,3
79			2
KV-DS			4,144,158
86			10
140			Tract B*
99			Tract C*
97			Tract D*
131			Tract E*

Source Sample : Lead, Copper, pH, Temp., Cond., Calcium, Alkalinity Analysis

* The following lists represent the sample numbers taken from each tract.

Tract B	Tract C	Tract D	Tract E
11	25	20	21
18	30	26	27
127	36	39	41
128	38	43	42
129	40	46	48
130	52	50	51
131	53	55	54
132	56	65	64
133	57	72	67
134	58	75	80
135	60	76	81
136	61	84	82
137	62	88	83
138	63	90	95
139	66	92	107
140	69	93	113
141	71	96	164
142	74	114	
143	78	115	
145	79	116	
146	86	117	
147	87	118	
148	89	119	
149	91	120	
150	98	163	
151	99		
152	100		
153	102		
154	103		
155	105		
156,	108		
157	109		
159	110		
160	111		
161	112		
166	122		
167	123		
168	124		
169	125		
170	126		
171	165		
172			
173			
174			
175			
176			

TABLE 3. Fresno Lead and Copper Rule Distribution System Sample Locations

Distribution System Sample Number	Distribution System Location Number	Address	Associated Pump Station Number
1	79	(b) (6) [redacted]	91
2	129		79, 97
3	126		KV-DS
4	68		86, 131
5	70		86
6	116		140
7	133		99
8	181		97
9	31		General* (91)
10	130		General* (91)
11	66		General* (KV-DS)
12	159		General* (86, 140)
13	158		General* (140)
14	134		General* (99)
15	34		General* (99)
16	36		General* (99)
17	202		General* (97)
18	81		General* (97)
19	155		General* (131)
20	69		General* (131)
21	82		General**
22	156		General**
23	128		General**
24	117		General**
25	76		General**

* General distribution system sample location , number in ( ) represents remotely associated pump station.

** General distribution system sample located in the same region as the tap sample locations.

Distribution Sample : pH, Temperature, Conductivity, Calcium, Alkalinity Analyses

SAMPLE PLAN
INITIAL MONITORING

FIRST DRAW TAP SAMPLES

The initial monitoring period consists of two consecutive 6-month sample periods during which the water is sampled from the homeowner's tap and analyzed for total lead and copper. The first set of these samples is to be collected between April 20 and 30, 1993. The second set of samples is expected to be collected in July 1993.

A minimum of 100 samples must be taken for each set. Table 1 presents a list of 136 homeowners that volunteered to collect samples at their tap. The instructions the homeowner will use to collect the samples are presented in Figure 1. An attempt should be made to hand deliver the sample bottles and demonstrate the sampling technique to as many homes as possible. Also, the presence of lead solder and copper pipe must be verified in 10-15% of the homes before the first set of samples can be taken.

The sample collection procedures will follow all EPA Guidelines in the Lead and Copper Rule. Some of the important sampling criteria include:

- The sample must be collected from a kitchen or bathroom tap.
- The water must stand in the pipes for at least 6 hours before the sample is collected.
- The sample must be a first-draw collection.
- The sample must be 1 liter in volume.

Sample kits should be prepared which include a 1 liter polyethylene sample bottle and written instruction (which includes a chain of custody form). The sample kits should be assembled in a 1 gallon plastic bag. Prior to delivery of the sample kits a label should be placed on each set of written instructions that includes the sample number and the

address. This sample number must also be entered on the sample bottle label.

The sample kits will be delivered to homeowners in person, if available, after again ascertaining that the home has copper plumbing. The homeowner will be instructed in taking the sample and how to fill out the chain of custody. Sample kits can be left at a homeowners doorstep if they cannot be reached in person. A follow up call to these homeowners should be made to make sure they understand the instructions.

The residents will then collect the sample and leave the sample bottle outside their home for pick-up the next morning. HDR and City Staff will pick-up the samples, verify that the sample number matches the address, and deliver the samples to BSK Laboratories, Inc. for analysis (see table below). A chain of custody must be filled out for all samples before delivery to the laboratory.

Lead and Copper Analytical Methods

Compound	EPA Method	Units	DLR*
Copper	200.7	mg/L	0.010
Lead	239.2	mg/L	0.001

* Detection limit for the purposes of reporting

QA/QC samples will be given to the laboratory along with the homeowner's samples. These samples will include spiked samples with a known concentration of lead, blank samples of distilled water, and duplicate samples split from spiked samples. These samples will represent approximately 10% of the total samples collected.

SOURCE WATER SAMPLES

The initial monitoring period consists of two consecutive 6-month sample periods during which the water is sampled from the well system. These samples are analyzed for lead, copper, pH, conductivity, temperature, alkalinity, and calcium. The first set of these samples is to be collected between April 20 and 30, 1993 along with the first draw tap samples. The second half of this set of samples is expected to be collected the week of May 17, 1993. The second set of samples will be collected the weeks of June 20 and July 12, 1993.

The source water for each first draw sample site must be sampled. Table 2 presents a list of eight well sites which are in the same general area as the first draw tap sample sites.

To collect the well samples, first flush the sample tap. Then collect a sample for field analysis of pH, temperature, and conductivity. Record the field measurements on a log sheet including the date, time, and location of sample. After performing the field analysis, collect the samples for lead, copper, alkalinity, and calcium in sample bottles provided by BSK Laboratories. Cool the samples for calcium and alkalinity to 4° C, label the bottles with the sample location, complete a chain of custody form for these samples, and deliver them to the laboratory within 24 hours for analysis (see table below).

Source Sample Analytical Methods

Compound	EPA Method	Units	DLR*
Copper	200.7	mg/L	0.010
Lead	239.2	mg/L	0.001
Calcium	200.7	mg/L	0.1
Alkalinity	310.1	mg/L as $CaCO_3$	1.0

* Detection limit for the purposes of reporting

DISTRIBUTION SYSTEM SAMPLES

The initial monitoring period consists of two consecutive 6-month sample periods during which the water is sampled twice from the distribution system. These samples are analyzed for pH, conductivity, temperature, alkalinity, and calcium. The first set of these samples is to be collected between April 20 and 30, 1993 along with the first draw tap samples. The second half of this set of samples is expected to be collected the week of May 17, 1993. The second set of samples will be collected the weeks of June 20 and July 12, 1993.

A minimum of 25 samples must be taken for each set. Table 3 presents a list of 25 coliform sample sites which are in the same general area as the first draw tap sample sites.

To collect the distribution system samples, first flush the sample tap as you would to collect a coliform sample. Then collect a sample for field analysis of pH, temperature, and conductivity. Record the field measurements on a log sheet including the date, time, and location of sample. After performing the field analysis, collect the samples for alkalinity and calcium in sample bottles provided by BSK Laboratories. Cool the samples to 4 C, label the bottles with the sample location, complete a chain of custody form for these samples, and deliver them to the laboratory within 24 hours for analysis (see table below).

Distribution System Sample Analytical Methods

Analysis	EPA Method	Units	DLR
Calcium	200.7	mg/L	0.1
Alkalinity	310.1	mg/L as $CaCO_3$	1.0

* Detection limit for the purposes of reporting

FIGURE 1. Fresno Lead and Copper Rule Homeowner Sampling Instructions

PLEASE TAKE THIS WATER SAMPLE FOR CITY OF FRESNO'S WATER DIVISION TOMORROW MORNING ON _____, __/__/93.

IF YOU HAVE ANY QUESTIONS OR CANNOT TAKE THE SAMPLE FOR ANY REASON PLEASE CALL BILL DUNN OR JEFF MURRAY AT 498-4136.

THANK YOU.

DIRECTIONS
RESIDENT TAP SAMPLE COLLECTION PROCEDURES

These samples are being collected to determine the contribution of faucet fixtures and household pipes and/or solder to the lead and copper levels in tap water. This sampling effort is required by the Environmental Protection Agency, and is being accomplished through the cooperation of homeowners and residents.

The collection procedure is described in detail below.

1. Do not use any water for 6-8 hours before sampling. The water department recommends that either early mornings or evenings upon returning home from work are the best sampling times to ensure that the necessary water conditions exist.

2. A kitchen or bathroom cold-water faucet is to be used for sampling. Place the open sample bottle below the faucet and gently open the cold water tap. Slowly fill the sample bottle to the base of the neck and turn off the water. It should take about 45 seconds to fill the bottle.

3. Tightly cap the sample bottle and place in the plastic bag provided. Fill in the information requested on the form below, sign the form, and place in the plastic bag along with the sample bottle. Please review the address label below at this time to ensure that all information contained on the label is correct.

4. Place the sample outside your home for pick-up by 9:00 in the morning.

5. Results from this monitoring effort will be provided to participating customers when reports are generated for the State.

Please call Bill Dunn at 498-4136 if you have any questions regarding these instructions.

TO BE COMPLETED BY RESIDENT:

PLEASE RETURN WITH SAMPLE.

Water was last used: TIME:_____ DATE: _____

Sample was collected: TIME:_____ DATE: _____

I have read the above directions and have taken a tap sample in accordance with these directions.

Signature_____ DATE: _____

Name: _____

TO BE COMPLETED BY THE WATER DEPARTMENT EMPLOYEE:

Sample picked up by:_____ DATE:_____

December 22, 1992

NINETEEN SEVENTEEN
HDR
NINETEEN NINETY TWO
75th Anniversary

Mr. Patrick Chann
US Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105-3901

Subject: City of Fresno - Lead and Copper Rule
Compliance Monitoring and Corrosion Assessment

Dear Patrick:

As per our conversation, HDR Engineering will be assisting the City of Fresno with the implementation of the Lead and Copper Rule. The first phase of our project will include the material survey, monitoring plan, assistance with sample collection and report preparation. The second phase will include the desk top study, corrosion assessment services and the bench scale study to select corrosion control treatment alternatives for "optimized corrosion control". The second phase will only be initiated if monitoring results indicate the need for corrosion control.

I have enclosed our Scope of Services which outlines our project approach.

If you have any questions, please contact Steve Reiber at (206) 453-1523 or me after January 8, 1993.

Very truly yours,

P. Standish-Lee

Perri Standish-Lee
Vice President

PSL:drm\050

Encls.

cc: Martin McIntyre
City of Fresno

Steve Reiber
HDR - Bellevue, WA

HDR Engineering, Inc.

5175 Hillsdale Circle
El Dorado Hills, California
95630-5700

Telephone
916 939-4100

CITY OF FRESNO

LEAD AND COPPER RULE COMPLIANCE MONITORING AND CORROSION ASSESSMENT STUDY

SCOPE OF WORK

GENERAL

The full scope of activities required by the Lead and Copper Rule is complex and rigorous. This scope of work covers compliance monitoring as well as corrosion control assessment. The project approach is therefore broken down into two phases.

HDR Engineering shall provide professional consulting services to assist the City of Fresno in complying with the requirements of the Lead and Copper Rule promulgated June 1991 by the U.S. EPA, while minimizing fiscal impact to the City. Task series are detailed below, ranging from survey of the City's plumbing materials, identification of compliance monitoring sampling sites, public notification and sample site recruitment, collection of tap water samples, distribution system water quality sampling, laboratory analyses, regulatory agency interface, and reporting activities. Modifications to the scope can be readily accommodated. As part of contract negotiations, the task series can be refined to include additional work detail.

Corrosion assessment services are included in the Phase II ranging from a desktop study, through a bench scale laboratory study screening potential treatment alternatives, to pilot scale assessment of the effect of potential treatment options.

Management functions for the coordination of the project, including:

Project Administration

General: Establish standards for the performance of the testing, study and reporting efforts. Review personnel assignments. Monitor laboratory services related to schedule and budget. Report changes in the scope and schedule to the City's Project Manager, and establish completion and partial completion milestones. Schedule work and staff on the project, and arrange for quality control reviews.

The project manager will obtain written authorization from the City's project manager prior to initiating each task. Each invoice will include an accounting summary of: % task completed, % budget spent, summary of previous invoices, and invoice to date.

PHASE I COMPLIANCE MONITORING ACTIVITIES

Meetings: HDR Engineering shall coordinate, chair, and document the following meetings:

- An initial meeting with the City.
- Quarterly progress meetings with the City.
- Two meetings with the State of California Department of Health Services, Drinking Waters Supply Branch to review protocols and present findings. Meetings will be conducted with the EPA as necessary.

Technical Quality Control: HDR shall hold three quality control review sessions with a total of three HDR Senior Engineers to review study procedures, protocols, and results for the purpose of developing a quality study effort and meaningful reports. The quality control review meetings will be held at key points in the project to be determined after finalizing the scope of work.

Task 1 - Materials Survey and Sampling Plan

The objective is to assist the City so that Lead and Copper Rule compliance monitoring meets all regulatory requirements, and provides meaningful data relative to the required corrosion assessment and control activities. HDR shall conduct a material survey of the Fresno distribution system and develop a sampling plan in accordance with Volume 1 of the EPA Guidance Manual. To this end HDR shall:

- Conduct the City's materials survey and water quality sampling plan.
- Develop a list of potential tap and distribution system sampling points for compliance with the EPA requirements of the Lead and Copper Rule (risk tier analysis).

- Conduct sample site recruitment activities, including general canvasing, site-specific questionnaire, data verification, follow-up and site selection.
- Assist the City with the procedural issues in submitting the Water Quality Monitoring Program documentation to the appropriate state and county regulatory agencies.

Sample Collection and Analysis

Task 2

The sampling program is comprised of two successive six-month sampling periods, and includes tap water metals sampling (copper and lead), general distribution water quality sampling, and source water sampling. The first round of tap water metals samples will include approximately 150 sampling sites (100 priority, 50 reserve). In the second round, the number of reserves may be reduced to as low as ten. Distribution system water quality sampling requires identification of 25 sites dispersed throughout the system. These sites may coincide with sites currently being used for coliform sample collection. Source water sampling will be conducted of a selected group of wells representing aquifers and water quality parameters in the system.

HDR shall be responsible for:

- Coordination of the sampling program, including scheduling, sample collection, sample validation and chain of custody papers (See table below).

	Sample Collection Tasks	Responsibility
1.	Send out sample kits with instructions	City
2.	Verify by phone that kits were received and instructions are clear	City
3.	Collect samples	City/HDR
4.	Verify materials in selected homes	HDR
5.	Collect and analyze distribution samples	Lab
6.	Collect source water samples	City

- Insuring EPA approved sample collection methods are followed.
- Quality Assurance/Quality Control procedures.
- Notification of the sampling participants of the results of their water analysis.
- Modifications to the compliance monitoring program that may help the program to comply with the Lead and Copper Rule and to improve the usefulness of the data relative to subsequent corrosion control effort.

Task 3 *Assess Water Quality Monitoring Results*

HDR Engineering will review the water quality monitoring results for the first six-month sampling, and repeat sampling. HDR will:

- Analyze the data and evaluate the metal leaching rates and corrosivity of the water relative to compliance with the Lead and Copper Rule.
- Determine if there are any geographical water quality patterns that would help in assessing the source of any Lead and Copper Rule compliance concerns.
- Prepare a technical memorandum outlining HDR's assessments and findings at the end of each six-month sampling, including assessment of the system's status relative to the EPA "optimal corrosion control" criteria.
- Prepare the respective sampling period submittals to the State describing the findings of the Lead and Copper Rule compliance monitoring.

PHASE II CORROSION CONTROL ASSESSMENT "Demonstration Study"

Task 1 - Corrosion Control Optimization - Background Review

The objective is to develop necessary background information, conduct a literature based review of potential treatment alternatives, and assess existing information relative to compliance with the "optimal corrosion control" requirements defined in the Lead and Copper Rule. The components of this work element have been suggested by the Lead and Copper Rule Guidance Manual (Volume II), a document presenting the EPA's

interpretation of what constitutes an acceptable corrosion control study.

Components--

Summarize State and Federal Lead and Copper Rule: The Engineer shall prepare a summary of the State and Federal Lead and Copper rules and regulations as they impact existing and planned treatment practices.

Assess Present Water Quality and Treatment Practices: The Engineer will review the water quality data (listed below), review present and planned future treatment practices and briefly summarize those treatment practices that may have an impact on treated water corrosivity. The Engineer shall:

- Establish baseline water quality conditions through an evaluation of the following:
  - One year of source water quality data from the City's well fields.
  - One year of data from the distribution system.

  Water quality data to be evaluated (if available) includes:

  - Lead
  - Copper
  - pH
  - TDS/conductivity
  - Calcium
  - Alkalinity
  - Silica
  - Temperature
  - Dissolved Oxygen
  - Langelier Index
  - Ortho/total phosphate

- Assess available data and information from any corrosion testing previously conducted.

- Summarize the findings and conclusions in a technical memorandum on present and future treatment practices that may have an impact on corrosivity.

Wastewater System Impacts: The Engineer shall investigate and identify present and potential future wastewater system rules and regulations which may affect the selection of a corrosion control alternative (such as zinc standards).

Screen Corrosion Control Treatment Alternatives: The Engineer will perform a literature based review of feasible corrosion control treatment alternatives, as well as case-studies of their implementation in comparable systems.

- Based on available information the Engineer will identify and describe potential treatment processes to reduce corrosivity, which may include any or all of the following:

  - No action
  - pH adjustment
  - Alkalinity adjustment
  - Calcium addition
  - Bimetallic-phosphate inhibitors
  - Zinc-orthophosphate inhibitors
  - Poly-phosphate inhibitor blends
  - Orthophosphate addition coupled with pH adjustment
  - Silicate inhibitors

- The Engineer will develop basic comparative cost data for each of the treatment alternatives screened. The analysis will include estimates of the capital construction costs, annual chemical costs, and operations and maintenance costs. Moreover, to fully develop cost comparisons, estimates of reduced corrosion on both distribution and residential plumbing systems for each alternative will be combined into a cost: benefit analysis that compares utility outlay for corrosion control with probable benefits derived to both the utility and the

consumer. The benefits (aside from regulatory compliance) consist chiefly of extended premise plumbing and distribution line service life, maintenance of hydraulic capacity, and enhanced protection of distribution reservoirs.

- The Engineer will assess the feasible treatment alternatives in terms of reliability, flexibility, and adaptability to the existing and planned treatment facilities. Based on this evaluation, and the findings in Parts A and B, the Engineer will identify the five most appropriate treatment alternatives, document the selection criteria, and submit the results in a technical memoranuma.

Task 2 **Basic Corrosion Assessment Services**

The purpose of this work element is to accurately determine the base-line corrosion rates on copper, solder, galvanized, and iron surfaces under the current water quality regimen, and then repeat these measures after implementation of the selected corrosion-control treatment to validate effectiveness of the control strategy.

Methodologies--
Corrosion rates to be determined by weight loss using a pipe-coupon/sleeve protocol (modified ISWS tester). Test sleeve panels to be installed at multiple locations in the distribution system. Rate determinations to be made at 30, 90, and 180 day intervals. Test-sleeve panels will include flow control devices to simulate the standing and flowing water conditions typical of residential use patterns. Metal release rates to be determined simultaneously with corrosion rates by collection of sleeve water following stagnation periods.

Test Materials--
Each test-sleeve holds ten coupons of a single metal type. Because of the variation inherent in any individual coupon measure, all ten coupons from a single sleeve are simultaneously

sacrificed to give a statistically valid interpretation of cumulative corrosion rate over the period of exposure. The coupon types of interest would include:

- mild steel (black iron)
- galvanized iron
- copper pipe sections
- Pb/Sn solder coated coupons
- coupled Pb/Sn solder-copper coupons (facsimile of solder sweated joint)

Test Duration--

Assessment activities would include determination of base-line rates prior to corrosion-control implementation, followed by a duplicate post-control assessment. Because exposure duration influences weight loss, long-term corrosion rates must be corrected relative to the initial weight loss. Hence, weight loss must be determined at several points in the exposure cycle. The standard exposure cycle sacrifices a sleeve for each coupon type at intervals of 30, 90, and 180 days.

Assessment Sites--

Characterizing the distribution system may require multiple assessment sites. One of these sites should be located in close hydraulic proximity to the location of any anticipated corrosion-control chemical additions. The other site should be located within the central service area. In the City of Fresno additional sites will be required representing differing water quality conditions.

Ancillary Testing--

Metal Release Rates. (Pb, Cu, Fe and Zn) to be determined biweekly for appropriate sleeves, at each testing site

Basic Water Quality Parameters. (pH, alkalinity, hardness, and inhibitor concentration) to be determined biweekly at each assessment site on both standing and flowing water samples.

Task 3 Laboratory Based Assessment of Corrosion-Control Treatment Alternatives "Inhibitor Screening Program"

This work element consists of laboratory screening (bench-scale) of the feasible corrosion-control options identified in Task 1 of Phase II. The intent is to identify the treatment option(s) and associated operating conditions (i.e., dosage rates) that give the best performance in the City's water. Depending on state interpretation, this screening program may satisfy the Lead and Copper Rule requirement of a comparative treatment performance evaluation.

Methodologies--

Because lead, copper, and Pb/Sn solders generally corrode uniformly, electrochemical (EC) techniques are a particularly appropriate assessment methodology. Two different EC measures would be used for copper and solder surfaces, respectively.

Potentiodynamic Scans--Potentiodynamic scanning will be used to make a series of corrosion rate measures on a set of copper pipe sections removed from the Kennewick system. Utilizing pipe sections with preformed scales will give a better indication of how the selected corrosion-control treatment alternatives will affect existing plumbing materials. Segments will be mounted in the PSFC polarization cell with continual recirculation of treated water.

Galvanic Current Measurements--Galvanic current between copper and Pb/Sn solder surfaces (facsimile of a solder sweated joint) can be measured directly in a galvanic flow cell mounted in parallel with the PFSC polarization cell.

Treatment Alternatives--

For purposes of this proposal it is assumed the evaluation will consist of the five most feasible corrosion-control treatment alternatives (Task 1 of Phase II) along with the three different water quality conditions - making a total of 15 conditions to be screened.

Given the flexibility and relatively short duration of this form of testing, additional treatment alternatives could be added to the testing program at relatively minimal cost.

Test Duration--

Continual coupon exposures will run for a minimum of 21-days for each treatment alternative investigated. With our current facilities and instrumentation, we can run three treatment alternatives simultaneously. Hence, with contingencies, the screening program would be completed inside of four months.