EXHIBIT 54

Testimony of Milk Producers Council
Before the
California Department of Food and Agriculture
Class 1 Price Hearing
May 3, 2005 Sacramento, California
May 6, 2005 Ontario, California
Presented by
Geoffrey Vanden Heuvel

Mr. Hearing Officer and Members of the Panel,

My name is Geoffrey Vanden Heuvel and I am a producer with dairy operations in San Bernardino and Riverside Counties. I am testifying today on behalf of Milk Producers Council, a dairy producer trade association with approximately 150 members located in Southern and Central California. My testimony for this hearing is based on positions adopted by the board of directors at their April 2005 meeting.

MPC Opposes the Dairy Institute Proposal

It's illegal

Section 61806 of the Food and Agriculture Code states that "It is the intent of the Legislature that the powers conferred in this chapter shall be liberally construed." However, the Legislature gave very specific instructions to the department about the establishment of class 1 prices. Section 62062.1 of the Food and Agriculture Code specifically instructs the department to establish a California class 1 price that is in "reasonable relationship" with the class 1 price paid to producers in contiguous states. The proposal of the Dairy Institute, if adopted by the department, would create, in our opinion, an illegal class 1 price by destroying the reasonable relationship that currently exists between the California statewide class 1 price and the class 1 price in states contiguous to California.

Decline in Per Capita Fluid Milk Sales a National Trend, not just a California phenomenon.

Data compiled by the US Department of Agriculture, as well as analyses done by various University and private entities all point to the reality that while total dairy product consumption is rising, per capita consumption of fluid dairy products is declining. We have seen no evidence that this appetite preference trend is created or even influenced in any significant way by the current class 1 producer price. (see exhibit A)

Decline in fluid milk consumption may be attributable to other factors

Some fluid milk is off flavor. There is plenty of evidence that fluid milk packaged in clear plastic jugs is highly susceptible to light-oxidized flavor defects. California producers through the Milk Advisory Board for years have sought to bring this very real milk taste "turn off" to the attention of processors. And yet a huge percentage of fluid milk sold today is still packaged in clear plastic jugs. We are baffled by the apparent unwillingness of fluid milk bottlers to address this documented flavor problem which certainly has a negative impact on consumption. (see exhibit B)

Dairy Institute Proposal would have minimal positive impact on sales

Fluid milk price elasticity estimates we have seen calculate that for every 1% increase in price of fluid milk there is a 0.085% to 0.136% reduction in demand. The Dairy Institute's proposal would decrease the producer price by about 6%. We of course are highly skeptical that consumers would see the whole 6% reduction, but even if they did, the impact on sales would be a one-time increase in sales of about 1/2%. Hardly worth the millions of dollars that it would cost producers. (see exhibit C)

The Dairy Institute Proposal would trigger almost monthly Compensatory Payment requirements.

If anything close to the Dairy Institute proposal were adopted by the department, California processors who sell milk into Federal Order areas like Las Vegas will be charged a Compensatory Payment almost every month of the year. FMMO administrators monitor route distribution in Clark County, Nevada and charge out of order processors compensatory payments if the class 1 price they are obligated to pay in California falls below the comparable federal order minimum price for that area. (Nearly 17% of the packaged milk sold in Las Vegas in March 2005 was bottled in California according to an official from the Nevada Dairy Commission.) The money charged to California processors in compensatory payments is given to producers who pool on the Arizona-Las Vegas Federal Order. The effect of this is a double whammy for California producers. We lose millions of dollars because of a reduced class 1 price and our out of state producer competition gains dollars from California processors because California producers were under paid for their milk. This situation certainly would be contrary to the policy of the State outlined in Section 61802(e) of the Food and Agriculture Code "...to eliminate economic waste..." (see Exhibit D)

Alternative Proposals

MPC Supports the Alliance Proposal

The Alliance of Western Milk Producers proposal seeks to address the apparent violation of Section 62062.1 that results when calendar year 2004 class 1 prices are evaluated. Clearly for 2004, California class 1 prices were too low in comparison to the class 1 prices in the contiguous states. MPC supports the Alliance proposal, which attempts to narrow that gap.

MPC Supports the California Dairy Campaign Proposal

The proposal by the California Dairy Campaign to directly hard wire the California class 1 price formulas to the Federal Order class 1 price mechanism is a very good idea and Milk Producers Council supports it as an alternative. All of the minimum class 1 pricing formulas in the States contiguous to California are tied to the Federal Order class 1 formula. The legislature in passing 62062.1 mandates that the California price must be in a reasonable relationship to those prices. The Federal Order system already has a class 1 differential for each California county established in their system ranging from $1.60 per cwt. to $2.10 per cwt. The CDC proposal seeks to line up the two marketing areas of California with those pre-established FMMO differentials. MPC believes that the CDC proposed class 1 price differentials of $1.80 for the Northern California Marketing Area and $2.05 for the Southern California Marketing Area are about right. We do recognize that the timing and methodology of the current system would be modified by this proposal, but we think the benefits of getting "in sync" with the class 1 formulas in the contiguous states justifies the change.

Conclusion
Milk Producers Council was opposed to the calling of this hearing. However, the Dairy Institute persisted in re-petitioning for a hearing on class 1 price levels even after they were repeatedly denied. Eventually the department relented and gave them a hearing. It is very clear to us that adopting anything close to the Dairy Institute proposal would violate Section 62062.1 of the Food and Agriculture Code and would therefore be illegal. We urge the department to follow the law and reject the Dairy Institute proposal and give favorable consideration to either the Alliance proposal or the California Dairy Campaign proposal.

Hoards Dairyman Feb. 25, 2005

Hoard's Dairyman Farm

EDITORIAL COMM

WILL PEOPLE EVER DRINK MORE MILK?

OVER the past 15 years, milk consumption per person dropped 15 percent . . . from 216 pounds to 183. We realize that the number of other beverages to choose from has soared during that time. And, sure, our population is aging, and older people drink less milk. But still, this decline took place despite the popular "Got Milk?" and milk mustache campaigns and milk's gradually improving image among health professionals.

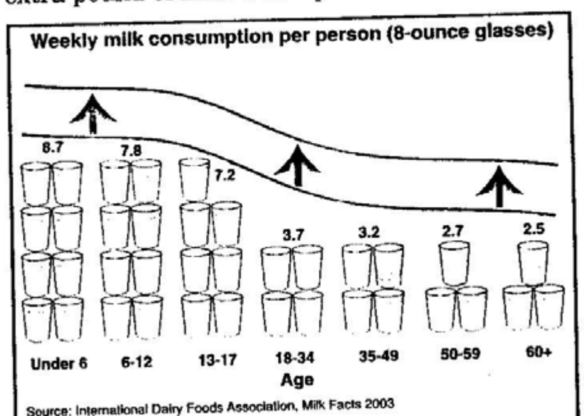
Now, many schools have greatly improved their lunchroom milk service, and milk sales figures from McDonald's and Wendy's sound almost too good to be true. Are these encouraging developments signs of a turnaround in fluid consumption?

Two thoughts come to mind. Point Number One . . . people are going to have to consume a lot of additional pints and half pints to make a dent in fluid use. Nearly 85 percent of milk is sold in gallons, half gallons, or bulk containers, and, remember, it takes 16 half pints to equal a gallon. Only about 2 percent of milk has been sold in pints and 9 percent in half pints, the vast majority of those in schools.

Between school-line and fast-food potential, we can boost fluid milk consumption by 1 billion pounds (2 percent) per year, according to Tom Gallagher, CEO of Dairy Management, Inc. That's providing enough processors are willing to provide the right milks in the right containers.

That brings us to Point Number Two. It is good to see half pints move across fast-food counters and be available in school lunchrooms. But what we're really after is improving life-long consumption. That is when we're going to see a turnaround in milk use. But we will have to have some patience.

We see similarities between lifetime milk consumption and a cow's lactation curve. For every extra pound of milk a cow produces at her peak,



she'll produce another 225 pounds during the lactation. Milk consumption climbs until about 5 or 6 years of age and then drops off over the years, as shown in the graph above. There's sound evidence that people who consume more milk as youths consume more as adults. Our best bet to improving lifetime consumption is to provide a positive school lunchroom milk experience to the nation's 27 million students.

EXHIBIT A

MARKETING SERVICE
BULLETIN

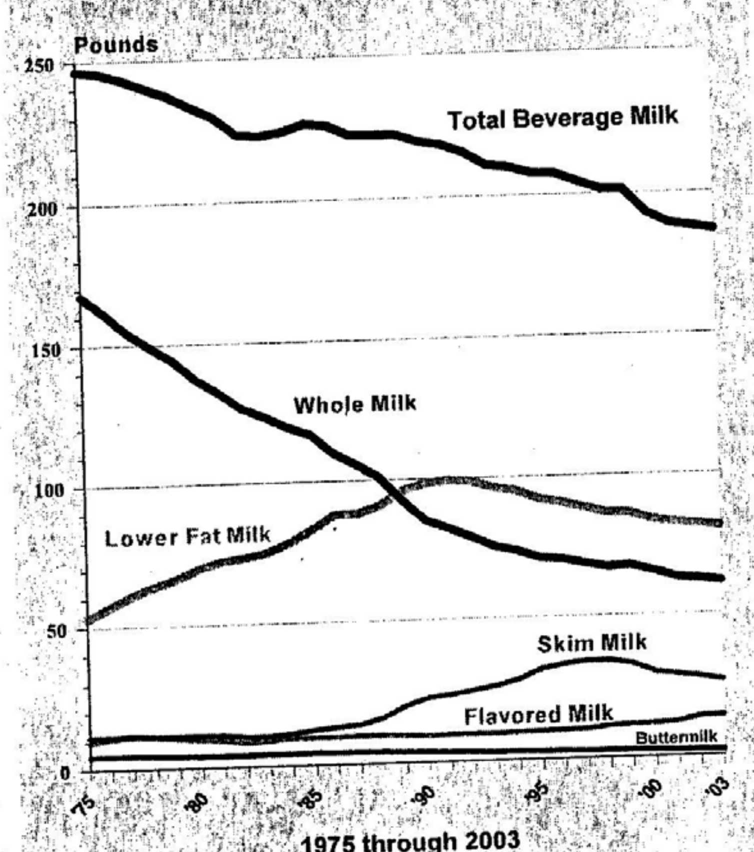
Per Capita Consumption of Selected Dairy Products

JULY 2004

Dairy product consumption has changed substantially over the past several decades. These changes have important implications for all involved in the production, processing, and marketing of milk and milk-based products. Particularly noteworthy are the trends in per capita consumption. The graphs in this bulletin depict per capita consumption data for various dairy products from 1975 through 2003*.

A continual downward trend in per capita sales of total beverage milk is indicated by the graph below. Per capita sales of whole milk, flavored whole milk, and buttermilk have all decreased significantly since 1975. Moreover, per capita sales of whole milk and buttermilk during 2003 were less than 50% of the level recorded in 1975. While lower fat fluid products posted substantial gains during much of this time period, per capita sales have declined in recent years for all items except flavored lowfat milk. The upper left graph on page two depicts 2003 per capita sales as a percentage of 1975 sales for selected fluid milk products.

Per Capita Sales of Fluid Dairy Products



1975 through 2003

The remaining graphs on pages two and three depict per capita consumption of selected dairy products. Cheese consumption has exhibited large gains as indicated by these graphs. To emphasize this point, the milk equivalent of cheese consumption has been greater than fluid milk and cream since the late 1980s. Mozzarella has posted the largest gains among hard cheeses with consumption rising from 2.12 pounds per person in 1975 to 9.64 pounds during 2003. Yogurt and cream products also posted significant per capita consumption gains during this time period.

* All 2003 data is preliminary. The source for all data in this bulletin is the June 29, 2004 issue of ***Livestock, Dairy, and Poultry Outlook***, United States Department of Agriculture, Economic Research Service.

Table 43--Summary of Packaged Sales of Fluid Milk Products in Federal Milk Order Marketing Areas, by Months 2004 1/ 2/

Federal Milk Order Marketing Area	Order Number	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
		Million Pounds												
Northeast	001	845	748	844	787	780	746	785	755	794	815	812	851	9,562
Appalachian	005	309	275	308	288	273	267	286	297	292	293	295	297	3,482
Southeast	007	423	378	407	397	381	360	379	408	409	415	413	414	4,784
Florida	006	259	240	262	247	232	218	236	248	237	248	252	258	2,938
Mideast	033	565	500	554	519	505	467	507	512	525	533	545	558	6,290
Upper Midwest	030	380	345	379	366	351	329	346	348	363	373	380	385	4,342
Central	032	415	370	405	389	367	350	369	384	391	398	404	406	4,647
Southwest	126	374	336	364	353	333	324	332	354	358	361	365	365	4,220
Arizona-Las Vegas	131	113	109	114	111	103	102	104	108	104	105	110	108	1,291
Western 3/	135	81	74	75	---	---	---	---	---	---	---	---	---	231
Pacific Northwest	124	187	167	187	179	176	170	174	174	182	183	190	187	2,156
All Markets Combined		3,950	3,541	3,900	3,636	3,501	3,333	3,518	3,589	3,655	3,723	3,766	3,830	43,942

1/ These figures are representative of the consumption of fluid milk products in Federal milk order marketing areas. Fluid milk products include: plain and flavored whole milk, eggnog, plain and flavored fat-reduced milk, buttermilk, and miscellaneous fluid milk products.
2/ All Markets Combined and TOTAL may not add due to rounding.
3/ Effective April 1, 2004, the Western Federal milk order was terminated.

Table 43--Summary of Packaged Sales of Fluid Milk Products in Federal Milk Order Marketing Areas, by Months, 2003 1/ 2/

Federal Milk Order Marketing Area	Order Number	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
		Million Pounds												
Northeast	001	841	778	820	788	826	750	754	768	801	834	791	855	9,606
Appalachian	005	314	268	285	278	290	264	282	299	300	307	266	299	3,452
Southeast	007	440	390	412	401	408	366	375	400	400	414	391	412	4,809
Florida	006	260	234	256	242	240	220	227	239	234	245	237	254	2,888
Mideast	033	574	509	542	519	541	478	497	518	525	543	522	549	6,317
Upper Midwest	030	388	348	376	360	373	328	343	349	370	385	366	378	4,364
Central	032	414	373	394	390	391	350	364	387	394	411	386	405	4,660
Southwest	126	378	330	350	348	355	318	335	350	353	374	340	356	4,187
Arizona-Las Vegas	131	117	105	110	109	110	99	105	109	108	113	107	114	1,303
Western	135	78	70	74	72	76	66	72	73	74	81	76	81	893
Pacific Northwest	124	190	169	186	181	186	166	173	175	178	189	180	185	2,159
All Markets Combined		3,992	3,572	3,806	3,689	3,795	3,406	3,527	3,667	3,737	3,897	3,661	3,888	44,638

1/ These figures are representative of the consumption of fluid milk products in Federal milk order marketing areas. Fluid milk products include: plain and flavored whole milk, eggnog, plain and flavored fat-reduced milk, buttermilk, and miscellaneous fluid milk products.
2/ All Markets Combined and TOTAL may not add due to rounding.

Table 43--Summary of Packaged Sales of Fluid Milk Products in Federal Milk Order Marketing Areas, by Months 2002 1/ 2/

Federal Milk Order Marketing Area	Order Number	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
		Million Pounds												
Northeast	001	841	753	836	803	838	763	784	799	796	845	838	841	9,738
Appalachian	005	308	269	289	281	288	258	287	303	282	299	290	288	3,442
Southeast	007	434	382	416	407	411	365	391	428	404	431	417	409	4,895
Florida	006	255	233	250	242	239	218	230	242	226	244	246	242	2,868
Mideast	033	555	512	555	530	539	475	507	538	528	567	554	543	6,402
Upper Midwest	030	385	344	375	367	374	324	346	368	363	390	384	374	4,393
Central	032	411	361	395	390	385	342	373	394	386	406	402	395	4,640
Southwest	126	375	325	350	347	352	316	337	361	348	373	357	346	4,186
Arizona-Las Vegas	131	111	101	109	105	107	97	103	108	102	110	111	111	1,275
Western	135	78	69	75	74	76	68	73	77	74	80	76	75	896
Pacific Northwest	124	191	166	184	179	187	163	177	182	179	195	189	184	2,175
All Markets Combined		3,944	3,515	3,833	3,725	3,797	3,389	3,607	3,800	3,689	3,939	3,863	3,810	44,910

1/ These figures are representative of the consumption of fluid milk products in Federal milk order marketing areas. Fluid milk products include: plain and flavored whole milk, eggnog, plain, solids added, and flavored fat-reduced milk, buttermilk, and miscellaneous fluid milk products.
2/ All Markets Combined and TOTAL may not add due to rounding.

Table 43--Summary of Packaged Sales of Fluid Milk Products in Federal Milk Order Marketing Areas, by Months, 2001 1/

Month	Total	Northeast	Appalachian	Southeast	Florida	Mideast
	Million Pounds					
January	3,929	828	307	433	253	566
February	3,512	761	270	384	228	500
March	3,974	876	307	435	260	566
April	3,620	786	277	397	234	512
May	3,731	829	288	410	225	534
June	3,542	787	274	394	221	499
July	3,505	768	274	389	220	495
August	3,779	796	306	431	239	525
September	3,654	796	278	403	221	521
October	3,959	859	302	432	242	562
November	3,849	840	298	414	237	551
December	3,808	846	283	404	242	552
Total 2/	44,863	9,772	3,464	4,925	2,821	6,383

Month	Upper Midwest	Central	Southwest	Arizona-Las Vegas	Western	Pacific Northwest
	Million Pounds					
January	383	412	369	108	77	192
February	344	369	322	97	70	166
March	387	408	359	107	78	191
April	350	383	336	100	71	177
May	365	375	348	100	75	183
June	341	359	325	98	69	175
July	338	357	322	97	70	176
August	364	393	359	108	79	180
September	362	380	342	100	71	179
October	388	410	383	110	80	193
November	377	399	358	108	77	188
December	375	395	345	108	73	185
Total 2/	4,374	4,640	4,169	1,242	889	2,184

1/ These figures are representative of the consumption of fluid milk products in Federal milk order marketing areas. Fluid milk products include: plain and flavored whole milk, eggnog, plain, solids added, and flavored fat-reduced milk, buttermilk, and miscellaneous fluid milk products.
2/ May not add due to rounding.

Summary of Packaged Sales of Fluid Milk Products in Federal Milk Order Marketing Areas, by Months, 2000 1/ 2/

Federal Milk Order Marketing Area	Order Number	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
		Million Pounds												
Northeast	001	842	792	857	789	820	777	778	793	817	825	825	865	9,779
Appalachian	005	320	281	313	278	299	283	285	314	300	300	301	303	3,577
Southeast	007	437	394	429	394	415	389	386	423	422	419	420	418	4,946
Florida	006	238	236	254	230	233	218	221	233	228	232	236	242	2,801
Mideast	033	572	550	574	541	564	516	521	544	557	552	561	575	6,627
Upper Midwest	030	376	357	383	350	371	340	340	361	372	376	379	384	4,388
Central	032	392	376	402	370	381	358	362	393	399	401	399	409	4,644
Southwest	126	353	336	367	331	346	327	326	363	350	359	358	347	4,163
Arizona-Las Vegas 3/	131	174	172	187	165	175	167	164	180	179	182	180	177	2,102
Pacific Northwest	124	183	174	187	173	186	172	173	181	190	189	190	186	2,184
All Markets Combined		3,887	3,668	3,953	3,620	3,790	3,547	3,556	3,785	3,814	3,834	3,850	3,907	45,210

1/ These figures are representative of the consumption of fluid milk products in Federal milk order marketing areas. Fluid milk products include: plain and flavored whole milk, eggnog, plain, solids added, and flavored fat-reduced milk, buttermilk, miscellaneous fluid milk products.
2/ All Markets Combined and TOTAL may not add due to rounding.
3/ The monthly data for these markets have been combined for reporting purposes. The annual figures for Arizona-Las Vegas and Western are 1,212 and 890 million pounds, respectively.

CORNELL UNIVERSITY ---------------- DAIRY SCIENCE FACTS
2002

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Department of Food Science
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Light-Oxidized Flavor Defect of Milk

Good quality milk should have a pleasantly sweet and clean flavor with no distinct aftertaste. Milk, however, is a delicate food that is often mishandled in a manner that can result in off-flavors. Excessive exposure to light is one manner of mishandling that can result in a serious flavor defect known as **light-oxidized**. Light-oxidized milk is characterized as having a burnt protein (i.e. burnt feathers or hair), medicinal or plastic-like flavor. A more severe light-induced defect may be perceived as a flavor similar to old vegetable oil. Depending on the intensity of the light-oxidized flavor, consumers will generally vary in their ability to detect this defect; some may find the milk objectionable while others will detect no specific defect.

How does a light-oxidized defect develop in milk?

Light-oxidized defect develops in milk as a result of its exposure to sunlight or to fluorescent lighting (wavelengths below 620 nm) common in store dairy cases. Light initiates a chemical reaction in milk that modifies specific proteins and fats, resulting in the characteristic off-flavors. **Certain vitamins (i.e. riboflavin and vitamin A) are also susceptible to light-induced degradation in a similar manner**. Exposure to sunlight for as little as 10-15 minutes (5 minutes in very intense light) is sufficient to cause the defect, while longer exposure times are generally required for fluorescent lighting. The closer the milk is to the fluorescent light source (or the more intense the light), the quicker the development of the off-flavor. In general, the defect is more common in milk packaged in transparent glass or plastic, though it can also occur in milk in paper cartons if there is sufficient light intensity and exposure time.

How can light-oxidized defects be prevented?

Preventing light-oxidized defects in milk simply involves protecting the milk from light, especially sunlight, and especially milk packaged in transparent plastic or glass. A few minutes exposure to the sun on a loading dock or during consumer transport may be all it takes. In dairy plants and stores, milk handling areas, storage coolers, and display cases should be designed with minimum lighting and to facilitate product rotation. When selecting lighting, "warm white" fluorescent lights generally have less degradative energy than the "cool white" variety. Yellow shielding has also been used to reduce the intensity of light. In storage areas, milk crates should not be stacked in a manner that results in close proximity to fluorescent lighting. Unnecessary lighting in coolers and display cases should be turned off during hours when milk turnover rate is slow. Though the convenience of plastic containers is attractive to most consumers, light-oxidized defect is more common in this type of packaging when compared to paperboard, so extra care is needed during transport and storage. Plastics containing light blocking agents or coloring (yellow) are used by some companies to protect their products from light-activated off-flavors and vitamin degradation. Lastly, protecting milk from light should not end at the store. Consumers should also be aware that milk needs to be protected from light during transport, storage and use.

MILK - BUY IT FRESH, KEEP IT COLD, PROTECT IT FROM LIGHT

Provided with support from the New York State Milk Promotion Order; Dairy Farmers dedicated to the production, manufacture and distribution of quality dairy products.

EXHIBIT B

when the pH >> pKa (5×10^7), compared to 10^6 when pH << pKa. Fully protonated histidine had a k_t of - 10^4. Tryptophan, having no ionizable protons in the ionizable groups in the tested pH range, showed no pH effect. Their research also showed that deprotonation of phenols in tyrosine results in an increase in k_t.

Michaeli and Feitelson (1995) compared the singlet oxygen reaction rate of large peptides to a solution of a comparative concentration of amino acids to each respective peptide. The free amino acids had a higher oxidation rate than did the native peptide. The fully denatured peptide had a quenching rate equivalent to the comparative solution of free amino acids, which indicates that the availability of amino acids—and not the peptide bond—is an important factor to the reactivity of a protein. The tertiary structure of the proteins acts to inhibit the reaction of singlet oxygen with singlet oxygen reactive amino acids, thereby imparting some degree of protection.

The reaction between amino acids and singlet oxygen is solvent dependant (Miskoski and Garcia 1993). Some amino acids can act as both physical and chemical quenchers. The singlet oxygen reaction rate constant of proteins is dependent on the types of amino acids, their accessibility to singlet oxygen, and the dielectric constant of the medium (Michaeli and Feitelson 1994). Jung and others (1995) reported that histidine and tyrosine accelerated the riboflavin-sensitized destruction of ascorbic acid and suggested that intermediate products of amino acid and singlet oxygen were accelerating the oxidation of ascorbic acid.

Singlet oxygen oxidation of amino acid for sunlight flavor in milk

Light-induced off-flavor in milk, which is referred to as sunlight flavor, has long been a recognized problem in the milk industry. White and Bulthaus (1982) reported that 53 of 90 grocery-store milk samples in plastic jugs under light have characteristic light-induced-off flavor. The mechanisms for the formation of sunlight flavor in milk have been studied for more than 50 y.

Many studies have identified several sulfur compounds in light-exposed milk. Samuelson (1962) used sulfur-35 radioisotope-labeled milk and found that mercaptan, sulfides, and dimethyl sulfides increased in milk during light irradiation. Harper and Brown (1964) found that photooxidation of cysteine produced mercaptan, sulfide, and disulfide. However, Patton and Josephson (1953) reported that cystine and cysteine were not necessary for the development of sunlight flavor in milk. Patton (1954) determined that both riboflavin and methionine were necessary for the formation of sunlight flavor. Allen and Parks (1975) reported that sunlight flavor development originated from a nonprotein source, likely free amino acids. Harper and Brown (1964) and Allen and Parks (1975) agreed that methional seems to be an important compound in the development of sunlight flavor, which was postulated to develop from methionine, although several researchers had difficulties in isolating and identifying methional. Balance (1961) reported that methional decomposed to form methyl mercaptan and dimethyl disulfide, perhaps lending to the difficulty of isolating methional. Allen and Parks (1975) were able to identify methional in skim milk exposed to light. They found that the sunlight flavor would develop in a serum obtained by negative pressure dialysis, indicating a nonprotein source. Hoskin (1979) postulated the formation of methional from methionine by a Strecker degradation-like reaction in the presence of riboflavin (Figure 18).

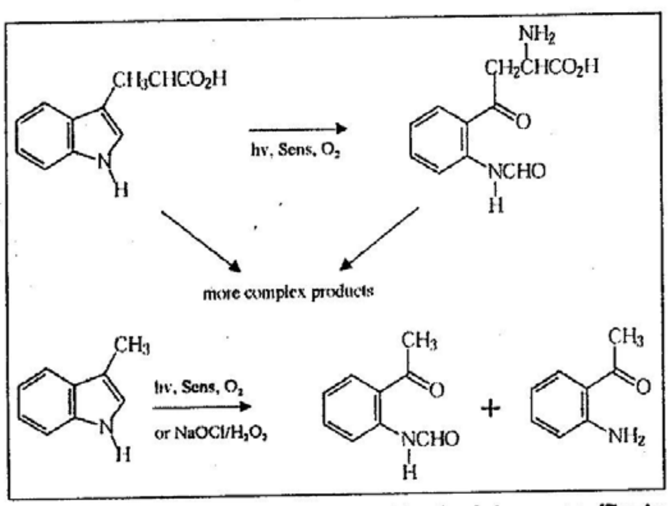

Figure 17–Reactions of tyrosine with singlet oxygen (Foote 1976)

However, the sunlight flavor is not produced under dark where a Strecker degradation-like reaction can occur under dark. If methional is formed from methionine by a Strecker degradation-like reaction under dark as postulated in Figure 18, the milk should produce sunlight flavor. The postulation of methional formation from methionine by a Strecker degradation-like reaction may be questionable.

Forss (1979) postulated that methanethiol, dimethyl sulfide, and dimethyl disulfide formed in light-exposed milk and was responsible for sunlight flavor. Dimick (1982) reported that prolonged light-exposure altered the methional flavor to a methyl mercaptan-like flavor and supported Balance's findings that methional decomposed to methyl mercaptan and dimethyl disulfide. Dimick and Kilara (1983) identified methionine sulfoxide, which was derived from methionine in the presence of light, and concluded that riboflavin, protein, and oxygen were required for the development of light-induced sunlight flavor in milk.

Foote (1976) was the first to suggest the role of singlet oxygen in light-induced off-flavor and reported that methionine sulfoxide is a product of singlet oxygen oxidation of methionine. Singlet oxygen formation in milk exposed to sunlight was detected using electron spin resonance spectroscopy (Bradley 1991). Jung and others (1998) reported that a trained sensory panel could identify sulfurous off-flavors in milk that was exposed to sunlight for 15 min. No sunlight flavor was detected in milk after a period of 8 h when the samples were stored in the dark. Sensory panel evaluations concluded that dimethyl disulfide was a key compound for the light-induced sunlight flavor in milk. Jung and others (1991) reported the mechanism for the formation of dimethyl disulfide by reaction between singlet oxygen and methionine as shown in Figure 19.

Jung and others (1998) evaluated light-induced off-flavor in solutions of cysteine, methionine, or valine exposed to sunlight. A hydrogen sulfide odor was found in the light-exposed cystein sample, and dimethyl disulfide was identified in the methionine sample that was exposed to light. Similar treatment of valine produced no such odors. No such odors were found in the absence of either light or riboflavin, thereby supporting the theory that light and riboflavin are required for the development of light-induced off-flavor. The riboflavin in milk was removed by liquid column chromatography using Fluorosil as a stationary phase. The riboflavin-free milk did not produce dimethyl disulfide or sunlight flavor under light storage. The sunlight flavor in milk was mainly due to the singlet oxygen oxidation of methionine in milk. The formation of dimethyl disulfide in milk decreased as the amount of added ascorbic acid increased from 0, 200, and 500 ppm to 1000 ppm. Ascorbic acid, which is a singlet oxygen quencher, minimized the formation of dimethyl disulfide in milk as was expected (Jung and others 1998).

CHAPTER 3

IMPACT OF GENERIC FLUID MILK AND DAIRY ADVERTISING ON DAIRY MARKETS: AN INDEPENDENT ANALYSIS

The Dairy Production and Stabilization Act of 1983 (Dairy Act; 7 U.S.C. 4514) and the Fluid Milk Promotion Act of 1990 (Fluid Milk Act; 7 U.S.C. 6407) require a yearly independent analysis of the effectiveness of milk industry programs. These promotion programs operate to increase milk awareness and thus the sale of fluid milk and related dairy products. From 1984 through 1994, USDA was responsible for the independent evaluation of the Dairy Program, as authorized by the Dairy Act, and issued an annual Report to Congress on the effectiveness of the Dairy Program. Beginning in 1995, the Congressional report began including third-party analyses of the effectiveness of the Dairy Program in conjunction with the National Fluid Milk Processor Promotion Program (Fluid Program) authorized by the Fluid Milk Act. While both programs utilize various types of marketing strategies to increase fluid milk and cheese consumption, this report focuses solely on media advertising impacts since advertising remains the most important marketing activity. The effects of fluid advertising under both programs are combined because the objectives of both programs are the same and data cannot be satisfactorily segregated to evaluate the two programs separately. An evaluation of the effectiveness of cheese advertising by the Dairy Program, however, is conducted separately.

Most economic models used to evaluate the effects of generic advertising programs over time measure the average impacts of various factors on demand. These "constant-parameter" models can be problematic when the time period covered is relatively long and/or the marketing environment has sufficiently changed over time. For example, this report is based on data since 1975; consequently, constant parameter demand models would estimate (among other variables) the effect of generic fluid milk and cheese advertising as an average point estimate over the 28-year period ending in 2002. In many instances, mean-response estimates are entirely appropriate; however, a mean-response model may not accurately convey the current degree of advertising effectiveness if sufficient changes have occurred in market environments, population profiles, and eating behavior over time. In addition, advertising messages have changed, two national programs have been instituted more than a decade apart, and State and regional programs have become more coordinated since the inception of the generic advertising programs.

An alternative approach to measuring the impacts of advertising, given a long history of time series data, is to use a "time-varying parameter" model. This type of model measures how the impact of demand factors, including generic advertising, varies over time. Similar to the approach of last year, this year's economic study adopts such a model and, consequently, examines how the effectiveness of generic fluid milk and cheese advertising has changed over time. The model also is able to identify important factors that have influenced the changes in advertising effectiveness over time.

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The relative impacts of variables affecting demand can be represented with what economists call "elasticities." Elasticities measure the percentage change in per capita demand given a 1.0 percent change in one of the identified demand factors. **Table 3-1** provides selected average elasticities over the most recent 5-year period. For example, the price elasticity of demand for cheese equal to –0.288 means that a 1.0 percent increase in the real, inflation-adjusted, cheese price decreases per capita cheese quantity demanded by 0.288 percent.[3]

While **Table 3-1** presents these elasticities evaluated over the most recent 5-year time period, the forthcoming discussion will also elaborate on how these elasticities were estimated to have varied over time. Although the principal focus of this report is on generic advertising elasticities for fluid milk and cheese, we also provide some exposition of time-varying responses for selected demand variables.

Fluid Milk

Based on the computed elasticities (**Table 3-1**), the primary factors influencing per capita fluid milk demand are: (1) the percentage of the population under 6 years of age, (2) the per capita disposable income, and (3) the percentage of the population that is African American. The relative amount of variation in these elasticities over time differs by demand factor. The demand response to changes in real prices has been consistently inelastic; i.e., consumers are relatively insensitive to changes in price. Given the nature of the product as a staple, this is expected. The change in estimated elasticities has increased from –0.050 early in the sample time period to a peak of around –0.100 in the early 1990s. Modest reductions have occurred since with a 5-year average of –0.085 (**Figure 3-1**). The implication of price elasticities all at or below –0.100 implies that fluid milk demand has consistently been largely insensitive to real price changes over time, which is a result consistent with the majority of empirical studies of fluid milk demand.

Income elasticities have shown relatively strong growth early in the sample time period but have been modestly declining over the last few years and currently are similar to estimated levels for cheese (**Figure 3-2**). The current income elasticity estimate for fluid milk is slightly below the 5-year average estimate of **Table 3-1**. For example, in 2002, a 1.0 percent increase in disposable (inflation-adjusted) income resulted in an average 0.540 percent increase in per capita fluid milk demand.

While the youngest-age cohort in the United States still remains a very important factor affecting fluid milk demand, reductions in elasticity estimates have decreased from approximately 1.200 in 1994 to a current value of approximately 0.720 (**Figure 3-3**). The 5-year mean-response estimate of 0.815 in **Table 3-1** also is indicative of the historically stronger demand component from this young age cohort. The current elasticity estimate implies that for every 1.0 percent decline in the proportion of the U.S. population under the age of six, there is a 0.720 percent decrease in per capita fluid milk demand (**Figure 3-3**).

[3] Relative to last year's report, most notable changes in mean elasticity estimates occurred for price (lower) and race (higher) effects. Price and income elasticities for cheese did not indicate the upward trend as estimated last year, due mostly to substantial changes in the food expenditure data. Trends for race and age effects were quite similar; however, some shifts in the magnitude from age to race did occur.

Lower per capita fluid milk demand of African Americans relative to the rest of the population is well recognized. The demand elasticity in **Table 3-1** indicates that a 1.0 percent increase in the proportion of the population that is African American has resulted in an average decrease in per capita fluid milk demand of –0.320; however, the statistical significance is somewhat lower.[4] Modest reductions in the impact of this factor have occurred since the mid-1990s, offsetting some the gains in its impact through the 1980s (**Figure 3-4**). The current demand elasticity of approximately –0.292 for this cohort proportion is similar to the 5-year mean estimate from **Table 3-1**.

<u>Cheese</u>

Returning to the 5-year mean-response demand elasticities of **Table 3-1**, it appears the primary factors influencing per capita cheese demand include: (1) the percent of the population that is ethnically Hispanic or Asian, (2) per capita disposable income, (3) the retail cheese price, (4) the percent of the population that is 20–44 years of age, and (5) per capita expenditures on FAFH. Price elasticity for cheese has shown a declining trend over time, indicating that consumers are becoming somewhat less responsive to changes in price; however, elasticity estimates are still well above those estimated for fluid milk. The mean response estimate of –0.288 in **Table 3-1** can be compared with levels around –0.350 in the late 1980s and –0.400 in the late 1970s (**Figure 3-1**). The current price elasticity of demand is approximately –0.296; i.e., a 1.0 percent increase in the real cheese price results in a 0.296 percent decrease in per capita cheese disappearance. As **Figure 3-1** demonstrates, the margin between the levels of price response between fluid milk and cheese over time has decreased from around 0.36, early in the sample time period, to around 0.22 currently.

Demand for cheese is relatively responsive to changes in per capita disposable income. Five-year response estimates indicate that a 1.0 percent increase in real per capita disposable income will increase per capita cheese demand by 0.558 percent (**Table 3-1**). Relative to fluid milk, income elasticities for cheese have been less variable (**Figure 3-2**). In fact, the gradual downward trend in income elasticities for cheese, combined with the increasing trend for fluid milk early in the sample period, has resulted in income elasticity estimates that are roughly equivalent for the two products currently. Stronger levels of income response, e.g., to that of price, may be indicative of gains in disappearance from purchases of more value-added products, relative to reactions to price changes of products in general. While still inelastic, relatively strong income elasticities for fluid milk and cheese are intuitively attractive to future changes in per capita disappearance as real income levels have continued to rise.

As hypothesized, the middle-aged population cohort (ages 20 through 44) was shown to be positively correlated with per capita cheese disappearance (0.271), though with a somewhat lower level of statistical significance (**Table 3-1**). However, the time-varying results do demonstrate continued modest gains in this cohort effect over time (**Figure 3-3**).

[4] The level of significance can generally be interpreted as a confidence measure. For example, at the 10 percent significance level, we are 90 percent confident (100-10) that the estimate is statistically different from zero. As such, the lower the significance level, the higher the degree of confidence in the empirical estimates.

Table 3-1. Average Elasticity Values (1998–2002) for Factors Affecting the Retail Demand for Fluid Milk and Cheese [1]

Demand Factor	Fluid Milk	Cheese
Retail Price	–0.085**	–0.288**
Per capita income	0.576**	0.558**
Per capita food away from home expenditures	n.a.	0.112**
Percent of population age < 6	0.815**	n.a.
Percent of population age 20–44	n.a.	0.271*
Percent of population African American	–0.320*	n.a.
Percent of population Hispanic/Asian	n.a.	0.796**
Generic advertising	0.041**	0.038**

[1] Example: A 1.0 percent increase in the retail price of cheese is estimated to reduce per capita sales of cheese by 0.288 percent. Note: n.a. means not applicable. For more information on the data used to estimate these elasticities, see Table 3-4.

* Statistically significant at the 15% significance level.

** Statistically significant at the 10% significance level or less.

Table 3-1. *Average elasticity values (1997-2001) for factors affecting the retail demand for fluid milk and cheese.*[a]

Factors affecting demand	Fluid Milk	Cheese
Retail price	-0.136	-0.459
Per capita income	0.645	0.753
Per capita food away from home expenditures	n.a.	0.197
Percent of population under 6 years of age	0.916	n.a.
Percent of population 20 to 44 years of age	n.a.	0.590
Percent of population African American	-0.239	n.a.
Percent of population Asian/Other	n.a.	0.557
Generic Advertising	0.041	0.039

[a] Example: A one-percent increase in the retail price of fluid milk is estimated to reduce per capita sales of fluid milk by 0.136 percent. n.a. means "not applicable."

§ 1000.76 Payments by a handler operating a partially regulated distributing plant.

On or before the 25th day after the end of the month (except as provided in § 1000.90), the operator of a partially regulated distributing plant, ***other than a plant that is subject to marketwide pooling of producer returns under a State government's milk classification and pricing program,*** shall pay to the market administrator for the producer-settlement fund the amount computed pursuant to paragraph (a) of this section or, if the handler submits the information specified in §§ ----.30(b) and ----.31(b) of the order, the handler may elect to pay the amount computed pursuant to paragraph (b) of this section. A partially regulated distributing plant that is subject to marketwide pooling of producer returns under a State government's milk classification and pricing program shall pay the amount computed pursuant to paragraph (c) of this section.

(a) The payment under this paragraph shall be an amount resulting from the following computations:
(1) From the plant's route disposition in the marketing area:
(i) Subtract receipts of fluid milk products classified as Class I milk from pool plants, plants fully regulated under other Federal orders, and handlers described in § 1000.9(c) and § 1135.11, except those receipts subtracted under a similar provision of another Federal milk order;
(ii) Subtract receipts of fluid milk products from another nonpool plant that is not a plant fully regulated under another Federal order to the extent that an equivalent amount of fluid milk products disposed of to the nonpool plant by handlers fully regulated under any Federal order is classified and priced as Class I milk and is not used as an offset for any payment obligation under any order; and

(iii) Subtract the pounds of reconstituted milk made from nonfluid milk products which are disposed of as route disposition in the marketing area;

(2) For orders with multiple component pricing, compute a Class I differential price by subtracting Class III price from the current month's Class I price. Multiply the pounds remaining after the computation in paragraph (a)(1)(iii) of this section by the amount by which the Class I differential price exceeds the producer price differential, both prices to be applicable at the location of the partially regulated distributing plant except that neither the adjusted Class I differential price nor the adjusted producer price differential shall be less than zero;
(3) For orders with skim milk and butterfat pricing, multiply the remaining pounds by the amount by which the Class I price exceeds the uniform price, both prices to be applicable at the location of the partially regulated distributing plant except that neither the adjusted Class I price nor the adjusted uniform price differential shall be less than the lowest announced class price; and
(4) Unless the payment option described in paragraph (d) is selected, add the amount obtained from multiplying the pounds of labeled reconstituted milk included in paragraph (a)(1)(iii) of this section by any positive difference between the Class I price applicable at the location of the partially regulated distributing plant (less $1.00 if the reconstituted

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milk is labeled as such) and the Class IV price.
(b) The payment under this paragraph shall be the amount resulting from the following computations:
(1) Determine the value that would have been computed pursuant to § ----.60 of the order for the partially regulated distributing plant if the plant had been a pool plant, subject to the following modifications:
(i) Fluid milk products and bulk fluid cream products received at the plant from a pool plant, a plant fully regulated under another Federal order, and handlers described in § 1000.9(c) and § 1135.11 shall be allocated at the partially regulated distributing plant to the same class in which such products were classified at the fully regulated plant;
(ii) Fluid milk products and bulk fluid cream products transferred from the partially regulated distributing plant to a pool plant or a plant fully regulated under another Federal order shall be classified at the partially regulated distributing plant in the class to which allocated at the fully regulated plant. Such transfers shall be allocated to the extent possible to those receipts at the partially regulated distributing plant from the pool plant and plants fully regulated under other Federal orders that are classified in the corresponding class pursuant to paragraph (b)(1)(i) of this section. Any such transfers remaining after the above allocation which are in Class I and for which a value is computed pursuant to § ----.60 of the order for the partially regulated distributing plant shall be priced at the statistical uniform price or uniform price, whichever is applicable, of the respective order regulating the handling of milk at the receiving plant, with such statistical uniform price or uniform price adjusted to the location of the nonpool plant (but not to be less than the lowest announced class price of the respective order); and

(iii) If the operator of the partially regulated distributing plant so requests, the handler's value of milk determined pursuant to § ----.60 of the order shall include a value of milk determined for each nonpool plant that is not a plant fully regulated under another Federal order which serves as a supply plant for the partially regulated distributing plant by making shipments to the partially regulated distributing plant during the month equivalent to the requirements of section 7(c) of the order subject to the following conditions:

(A) The operator of the partially regulated distributing plant submits with its reports filed pursuant to §§ ----.30(b) and ----.31(b) of the order similar reports for each such nonpool supply plant;
(B) The operator of the nonpool plant maintains books and records showing the utilization of all skim milk and butterfat received at the plant which are made available if requested by the market administrator for verification purposes; and
(C) The value of milk determined pursuant to § ----.60 for the unregulated supply plant shall be determined in the same manner prescribed for computing the obligation of the partially regulated distributing plant; and
(2) From the partially regulated distributing plant's value of milk computed pursuant to paragraph (b)(1) of this section, subtract:
(i) The gross payments that were made for milk that would have been producer milk had the plant been fully regulated;
(ii) If paragraph (b)(1)(iii) of this section applies, the gross payments by the operator of

the nonpool supply plant for milk received at the plant during the month that would have been producer milk if the plant had been fully regulated; and

(iii) The payments by the operator of the partially regulated distributing plant to the producer-settlement fund of another Federal order under which the plant is also a partially regulated distributing plant and, if paragraph (b)(1)(iii) of this section applies, payments made by the operator of the nonpool supply plant to the producer-settlement fund of any order.

(c) The operator of a partially regulated distributing plant that is subject to marketwide pooling of returns under a milk classification and pricing program that is imposed under the authority of a State government shall pay on or before the 25th day after the end of the month (except as provided in § 1000.90) to the market administrator for the producer-settlement fund an amount computed as follows:

After completing the computations described in paragraphs (a)(1)(i) and (ii) of this section, determine the value of the remaining pounds of fluid milk products disposed of as route disposition in the marketing area by multiplying the hundredweight of such pounds by the amount, if greater than zero, that remains after subtracting the State program's class prices applicable to such products at the plant's location from the Federal order Class I price applicable at the location of the plant.

(d) Any handler may elect partially regulated distributing plant status for any plant with respect to receipts of nonfluid milk ingredients that are reconstituted for fluid use. Payments may be made to the producer-settlement fund of the order regulating the producer milk used to produce the nonfluid milk ingredients at the positive difference between the Class I price applicable under the other order at the location of the plant where the nonfluid milk ingredients were processed and the Class IV price. This payment option shall apply only if a majority of the total milk received at the plant that processed the nonfluid milk ingredients is regulated under one or more Federal orders and payment may only be made to the producer-settlement fund of the order pricing a plurality of the milk used to produce the nonfluid milk ingredients. This payment option shall not apply if the source of the nonfluid ingredients used in reconstituted fluid milk products cannot be determined by the market administrator.

§ 1131.52 Adjusted Class I differentials.
See § 1000.52.

The Class I differential adjusted for location to be used in § 1000.50(b) and (c) shall be as follows: See § 1000.53.

§ 1000.52 Adjusted Class I differentials. COUNTY	STATE		Differential
APACHE	AZ	04001	1.90
COCHISE	AZ	04003	2.10
COCONINO	AZ	04005	1.90
GILA	AZ	04007	2.10
GRAHAM	AZ	04009	2.10
GREENLEE	AZ	04011	2.10
LA PAZ	AZ	04012	2.10
MARICOPA	AZ	04013	2.35
MOHAVE	AZ	04015	1.90
NAVAJO	AZ	04017	1.90
PIMA	AZ	04019	2.35
PINAL	AZ	04021	2.35
SANTA CRUZ	AZ	04023	2.10
YAVAPAI	AZ	04025	1.90
YUMA	AZ	04027	2.10
ALAMEDA	CA	06001	1.80
ALPINE	CA	06003	1.70
AMADOR	CA	06005	1.70
BUTTE	CA	06007	1.70
CALAVERAS	CA	06009	1.70
COLUSA	CA	06011	1.70
CONTRA COSTA	CA	06013	1.80
DEL NORTE	CA	06015	1.80
EL DORADO	CA	06017	1.70
FRESNO	CA	06019	1.60
GLENN	CA	06021	1.70
HUMBOLDT	CA	06023	1.80
IMPERIAL	CA	06025	2.00
INYO	CA	06027	1.60
KERN	CA	06029	1.80
KINGS	CA	06031	1.60
LAKE	CA	06033	1.80
LASSEN	CA	06035	1.70
LOS ANGELES	CA	06037	2.10
MADERA	CA	06039	1.60

MARIN	CA	06041	1.80
MARIPOSA	CA	06043	1.70
MENDOCINO	CA	06045	1.80
MERCED	CA	06047	1.70
MODOC	CA	06049	1.70
MONO	CA	06051	1.60
MONTEREY	CA	06053	1.80
NAPA	CA	06055	1.80
NEVADA	CA	06057	1.70
ORANGE	CA	06059	2.10
PLACER	CA	06061	1.70
PLUMAS	CA	06063	1.70
RIVERSIDE	CA	06065	2.00
SACRAMENTO	CA	06067	1.70
SAN BENITO	CA	06069	1.80
SAN BERNARDINO	CA	06071	1.80
SAN DIEGO	CA	06073	2.10
SAN FRANCISCO	CA	06075	1.80
SAN JOAQUIN	CA	06077	1.70
SAN LUIS OBISPO	CA	06079	1.80
SAN MATEO	CA	06081	1.80
SANTA BARBARA	CA	06083	1.80
SANTA CLARA	CA	06085	1.80
SANTA CRUZ	CA	06087	1.80
SHASTA	CA	06089	1.70
SIERRA	CA	06091	1.70
SISKIYOU	CA	06093	1.80
SOLANO	CA	06095	1.80
SONOMA	CA	06097	1.80
STANISLAUS	CA	06099	1.70
SUTTER	CA	06101	1.70
TEHAMA	CA	06103	1.70
TRINITY	CA	06105	1.80
TULARE	CA	06107	1.60
TUOLUMNE	CA	06109	1.70
VENTURA	CA	06111	1.80
YOLO	CA	06113	1.70
YUBA	CA	06115	1.70

§ 1131.76 Payments by handler operating a partially regulated distributing plant.
See § 1000.76.