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PUBLIC OPINION IN COBB VALLEY
CONCERNING GEOTHERMAL DEVELOPMENT
IN LAKE COUNTY, CALIFORNIA

Larry Vollintine and Oleh Weres
Energy and Environment Division
June 1976

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Abstract

In the Spring of 1975 the Friends of Cobb, a local environmental group, polled the registered voters of the Cobb Valley precinct, Lake County, California, about their opinions regarding the development of geothermal energy in Lake County. Sixty-five percent of those polled responded, and an analysis of their responses is presented herein:

1) The people of the Cobb Valley (which lies directly in the path of geothermal development) are rather less pleased with the prospect than a previous poll has shown the people of Lake County as a whole to be. As measured by an index of general support for development, one-third of the Cobb people are for development, one-third are against, and the remaining third are undecided or have mixed feelings. (Countywide, nearly two-thirds support development.)

2) Support for and opposition to geothermal development correlate most highly with the perception of environmental impacts, the expectation of economic benefits in the form of increased job opportunities and tax revenues, and size of land holdings.

3) Among those who own more than ten acres of land, the willingness to lease land for geothermal development correlates most highly with the perception of environmental impacts.

I. Introduction

The Cobb Valley in Lake County, California, lies directly north of Cobb Mountain and three miles to the northeast of the developed Geysers geothermal power production area in Sonoma County. Preliminary air monitoring tests show it lies in a principle air flow path from the Geysers, and also that the valley has a propensity to form radiation inversions which can result in violations of state H₂S ambient air standards. Geothermal drilling activities on the north slope of Cobb Mountain are visible from some homesites in the Valley. The whole Valley is located within the KGRA (Known Geothermal Resource Area) and much of the surrounding land is already leased for geothermal exploration.

The Cobb Valley is a retirement and resort area composed of old recreational resorts, vacation and retirement homes, and a few ranches. There is no industrialization at the present time. Some residents of Cobb have become quite vocal opponents of geothermal development claiming that because of their location in the path of development, they will eventually be forced out by the environmental impacts of development for the sake of the county's industrialization. They have appealed a permit for exploratory drilling to the California Supreme Court. Others have become equally vocal proponents, citing the need for economic development. It is of interest to analyze the attitudes of these people concerning the geothermal development with which they are imminently faced.

In response to the publicity given the Spring 1975 county-wide opinion poll concerning geothermal development in Lake County*, the Friends of Cobb, a local environmental organization, conducted a more intensive opinion poll in the Cobb Valley using the same questionnaire. A copy was sent to every registered voter

* L. Vollintine and O. Weres, "Public Opinion Concerning Geothermal Development in Lake County, California," Report LBL-4447, Berkeley, California, 1976.

in the Cobb precinct (which includes the communities of Pine Grove, Whispering Pines, Forest Lake, Cobb, and the immediate surrounding area). Of the 219 questionnaires sent out, 142 (65%) were received by July 16, 1975 and included in the present analysis. Mrs. Frank Frates (who supervised the poll) and the Friends of Cobb have graciously allowed us to analyze their data and compare it with the results of the countywide survey.

In the interest of brevity, we include in the analysis of the Cobb data only those tables which are important to Cobb and to a comparison with the county data. In each case, the number of the corresponding table in the county survey is indicated in parenthesis. In cases where a new table was constructed for Cobb but not the county, the fact is also indicated. All terminology, indexing, aggregation, statistical processes, and technical qualifications remain the same as for the county survey, except where indicated. For a full explanation of each of these items, we refer the reader to the appropriate sections of the county survey report. However, we include no analysis of the comments made by the Cobb respondents. We suggest contacting Mrs. Frates for these.

The number of respondents to this survey is small. However, the fact that 65% of the registered voters of Cobb responded largely eliminates any potential problems with the statistical analysis. The respondents to each sample, Cobb and county, were kept separate at all times.

II. A Tabulation of Average Responses

Figure 1 is a photoreproduction of the questionnaire which was employed. A simple tabulation of the responses is presented in Table 1. Throughout the tables we employ suitable abbreviations for each question. Note the appearance of two new "questions" which did not appear in the original questionnaire. The "Go-No Go Index" is an "average" of each respondent's answers to questions 1 ("Need Economic Expansion"), 9 ("Would Lease"), and 10 ("Exploratory Wells"). Similarly, the "No Environmental Impacts Index" is an "average" of questions 6 ("No Odor Impacts"), 7 ("No Noise Impacts"), and 12 ("No Visual Impacts"). These "Indices" are used as general measures of enthusiasm for geothermal development and perception of its environmental impacts. (For a fuller discussion, see the countywide survey report).

The distribution of responses to the fifteen "policy" questions and certain "demographic" questions by the Cobb respondents is compared to the countywide responses in Table 2. (Note that in this and many other cases we have combined the responses 1 and 2 into simply "Agree" and responses 4 and 5 into simply "Disagree" in order to simplify the discussion).

The most obvious thing evident in Table 2 is the shift in responses to all of the policy questions in the anti-development direction relative to the countywide results. This is most striking in the cases of the Go-No Go Index, the "environmental" questions 6, 7, and 12 (and their average, question 25), and question 4 ("Benefits greater than Costs"). Countywide, about two-thirds of the respondents were "Go" and only one-sixth were "NoGo"; while in Cobb only a little over a third are "Go" and a nearly equal number are "NoGo." Countywide, the respondents were split equally on the perception of environmental impacts, while in Cobb, those who perceive deleterious environmental impacts outnumbered those who do not by 3 to 1. Likewise, only about 1 in 4 Cobb

respondents expects the economic benefits of geothermal development to exceed the environmental costs.

The apparent attitudes of Cobb residents concerning geothermal development may be summarized thus: they consider it to be environmentally harmful (questions 6, 7, and 12), but seem to value its probable economic benefits (questions 1 and 2). They seem willing to tolerate it (questions 3, 10, and 23), though they believe that, overall, it will be a losing proposition for them (questions 4 and 11). They also overwhelmingly favor close regulation of the industry (questions 5 and 23).

Dear Friend:

I NEED YOUR HELP! Currently, numerous areas of Lake County are being leased for geothermal development. Your opinions are important to the process of planning for geothermal activity by those of us who deal with it on a day to day basis. Therefore, with the assistance of a team from the University of California, this questionnaire has been sent to you and to 2500 other registered voters in Lake County to determine some county-wide concerns. The University people will tabulate your responses and the results will be made public. Please help by filling out this stamped, self-addressed questionnaire and by dropping it in any mail box, soon. And, thank you for your help.

Sincerely,

Donald F. Johnson
Donald F. Johnson
Lake County Planning Director
biw

P.S. I acknowledge - Any questionnaire is imperfect, but this one is better than none at all!

Please rate statements 1 thru 12 by writing a number in the circle provided using this scale:

- 1 agree
- 2 conditionally agree
- 3 no opinion
- 4 mildly disagree
- 5 disagree

- ☐ (1) Lake County needs to broaden its economic emphasis to more than agriculture, tourism, recreation and retirement.
- ☐ (2) Geothermal development will increase jobs and tax revenue in Lake County.
- ☐ (3) The Geothermal corporations have the primary responsibility to plan and conduct steam exploration and production properly.
- ☐ (4) The economic benefits from geothermal development are more important than the environmental costs.
- ☐ (5) Non-regulated geothermal development is compatible with agriculture, tourism, recreation and retirement.
- ☐ (6) Geothermal development will not cause unusual odor problems.
- ☐ (7) Noise from geothermal development is not bothersome.
- ☐ (8) Geothermal development will not cause me to move or to shorten my stay in Lake County.
- ☐ (9) I would lease my land for geothermal development.
- ☐ (10) Exploratory wells should be drilled so that the size and location of the steam resource is known.
- ☐ (11) Geothermal development will raise property values if located in my immediate neighborhood.
- ☐ (12) The construction of power plants, transmission lines, pipelines and roads which result from geothermal development, will not cause offensive visual distractions.

Please "X" or otherwise indicate your responses to statements 13 thru 21.

- (13) I live in or near (city, town or community). _____
- (14) I have lived in or maintained a home in Lake County 0-5 years (); 6-15 years (); over 15 years ().
- (15) I live in Lake County year round (); seasonally (); other _____.
- (16) I own my home in Lake County (); rent or lease (); other _____.
- (17) I own the mineral rights to my home property (); owned by others (); don't know (); not applicable ().
- (18) I own more than ten (10) acres in Lake County (); less than 10 acres (); 10 to 40 acres (); more than 40 acres ().
- (19) I am presently employed (); self-employed (); retired or semi-retired (); other _____.
- (20) I enjoy the following types of recreation ("X" as many as may apply). Fishing (); hunting (); hiking (); camping (); boating (); swimming () and/or wading in streams or lakes (); swimming in pools (); observing nature (); golfing (); relaxing and socializing outside the house (); other _____.
- (21) I live in Lake County for the following reasons ("X" as many as apply): Born here (); family roots or friends (); employment base (); retirement (); natural environment (); recreation opportunity (); health reasons (); housing availability (); other _____.
- (22) I have visited a geothermal well site or power plant. Yes () No ().
- (23) Lake Co. geothermal should be prohibited (); closely regulated (); un-regulated ().

Use the space below for any other comments or observations you may want to include.

Figure 1. Original questionnaire (original was 11" by 14").

Table 1 (County Table 1).
Simple Percentage Tabulation of Responses *
Cobb Survey

Q.#	Title	N	Agree 1	2	No Opinion 3	4	Disagree 5
1.	Need Econ. Exp.	142	44	23	6	7	20
2.	Increase Jobs & Tax Revenues	141	45	26	4	8	18
3.	Trust Geothermal Companies	139	53	17	1	2	26
4.	Economic Benefits > Environmental Costs	140	7	19	1	9	64
5.	Non- Regulated Development Compatible	139	3	2	1	3	91
6.	No Odor Impacts	142	9	16	3	11	61
7.	No Noise Impacts	142	14	13	2	9	63
8.	Would Not Move	141	40	10	6	7	37
9.	Would Lease	140	22	6	12	2	57
10.	Exploratory Wells	142	42	20	8	6	24
11.	Increase Prop. Values	142	16	6	11	4	65
12.	No Visual Impacts	142	11	12	4	13	61
13.	Geographic Location - Cobb						
14.	Years of Residency in County	142	<u>0-5</u> 25	<u>6-15</u> 27	<u>>15</u> 49		
15.	I Live in Lake County	142	<u>Year-Round</u> 97	<u>Seasonal</u> 1	<u>Other</u> 1		
16.	I:	142	<u>Own Home</u> 92	<u>Rent</u> 4	<u>Other</u> 4		
17.	Mineral rights owned by	139	<u>Self</u> 67	<u>Others</u> 6	<u>D.K.</u> 17	<u>N.A.</u> 11	

* Percentages on this and other tables may not sum to 100% due to round-off.

Table 1 (County Table 1). Simple Percentage Tabulation of Responses (cont.)
Cobb Survey

18.	Land Parcel Size	<u>N</u> 135	<u><10 acres</u> 67	<u>>10 acres</u> 33			
19.	I am:	142	<u>Employed</u> 37	<u>Retired</u> 54	<u>Other</u> 9		
20.	I enjoy the following types of recreation: N = 142						
			<u>% Yes</u>				
	Fishing		57				
	Hunting		26				
	Hiking		58				
	Camping		37				
	Boating		36				
	Swimming		52				
	Wading		39				
	Swim in Pools		45				
	Observe Nature		78				
	Golfing		44				
	Relax & Socializing		85				
	Other		18				
21.	I live in Lake County because: N = 142						
			<u>% Yes</u>				
	Born Here		7				
	Family & Friends		44				
	Employment Base		29				
	Retirement Opportunities		46				
	Natural Environment		70				
	Recreation Opportunities		44				
	Health		42				
	Housing		8				
	Other		6				
22.	I have visited a Geothermal Facility. N = 142						
	<u>Yes</u>	<u>No</u>					
	72	28					
23.	Lake County Geothermal Should Be: N = 141						
	Prohibited	14					
	Closely Regulated	84					
	Unregulated	2					
24.	Go-NoGo Index		<u>Agree</u>		<u>Disagree</u>		
	(Average of Questions		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
	1,9,10). N = 142		32	5	30	12	21
25.	No Environmental Impacts Index						
	(Average of Questions						
	6,7,12). N = 140		12	11	8	3	66

Table 2 (No County Table).
Simple Percentage Tabulations of Responses
for Comparison

Q. #	Title	COBB			COUNTY		
		Agree	No Op.	Disagree	Agree	No Op.	Disagree
1.	Need Econ. Exp.	67	6	27	77	1	22
2.	Increase Jobs & Tax Revenues	71	4	26	83	5	12
3.	Trust Geothermal Companies	70	1	28	76	6	18
4.	Economic Benefits > Environmental Costs	26	1	73	51	5	44
5.	Non-Regulated Development Compatible	5	1	94	26	7	67
6.	No Odor Impacts	25	3	72	34	27	39
7.	No Noise Impacts	27	2	72	37	23	41
8.	Would Not Move	50	6	44	78	7	15
9.	Would Lease	28	12	59	51	16	34
10.	Exploratory Wells	62	8	30	82	9	10
11.	Increase Prop. Values	22	11	69	34	24	41
12.	No Visual Impacts	23	4	74	48	11	41
24.	Go-No Go Index (Average of Questions 1,9,10)	37	30	33	68	16	16
25.	No Environmental Impacts Index (Average of Questions 6,7,12).	23	8	69	39	23	39
		<u>COBB</u>			<u>COUNTY</u>		
14.	Years of Residency in County	<u>0-5</u> 25	<u>6-15</u> 27	<u>>15</u> 49	<u>0-5</u> 35	<u>6-15</u> 29	<u>>15</u> 37
18.	Land Parcel Size	<u><10</u> <u>acres</u> 67	<u>>10</u> <u>acres</u> 33		<u><10</u> <u>acres</u> 63	<u>>10</u> <u>acres</u> 37	
19.	I am:	<u>Employed</u> 37	<u>Retired</u> 54		<u>Employed</u> 51	<u>Retired</u> 44	
22.	I have visited a Geothermal Facility.	<u>Yes</u> 72	<u>No</u> 28		<u>Yes</u> 43	<u>No</u> 58	
23.	Lake County Geothermal Should be:						
	Prohibited		14			8	
	Closely Regulated		84			85	
	Unregulated		2			7	

III. The Influence of Demographic Variables Upon Attitudes Toward Geothermal Development

The Cobb respondents showed less enthusiasm for geothermal development than the county as a whole. While roughly 75% of the county respondents favored economic expansion and exploratory wells, only 60-65% of Cobb did so.

Table 3 depicts various demographic factors relating to the support for geothermal development. Two items stand out as different from the county-wide survey. Among Cobb respondents, those who have visited geothermal facilities are more in favor of development than those who have not. The other and even more interesting fact is that support for development depends greatly on the size of one's land parcel. This relationship is much stronger than for the county as a whole. This is demonstrably due to the inclusion of the leasing question in the construction of the Go-No Go Index. The leasing question alone is discussed in some detail in Section VIII.)

The length of residence in the county has a correlation with Go-No Go attitude not found in the county-wide survey. Just as we previously found for the south county subgroup of the respondents to the county-wide poll, the long term residents in Cobb are the most pro-geothermal group. The 6-15 year resident group is the least pro-geothermal (in Cobb) and the most unsure of its position. The long term residents are more polarized than the others, and the retired residents are more polarized than the employed.

In Table 4 we attempt to isolate the interacting influences of land parcel size, length of residence in the county, and employment status upon the Go-No Go Index. (There is no corresponding Table 4 in the county survey since none of these three variables was significant). Perhaps the most interesting fact shown in Table 4 is that in Cobb, the bulk of the support or opposition to geothermal development comes from similar groups. The largest single group of

Table 3 (County Table 3).
Various Demographic Factors Relating to Go-NoGo Index
Cobb Survey

	% Go	% No Opinion	% NoGo	R
14. Length of Residency in County				
0-5 years	37	34	29	-
6-15 years	26	42	32	-
>15 years	43	21	36	-
17. Mineral Rights Ownership				
By Self	34	35	32	-
By Others	38	13	50	-
Don't Know	70	17	13	-
Not Applicable	14	29	57	-
18. Land Parcel Size				
Own < 10 acres	22	38	40	-
Own > 10 acres	65	16	19	-.336
19. I am:				
Employed	32	40	28	-
Retired	41	22	38	-
22. Have Visited Geothermal Site				
Yes	43	26	31	-
No	23	40	38	.142
24. Total Go-NoGo Index	37	30	33	-

proponents is composed of retired, long term residents who own more than 10 acres. Nearly 80% of these people are pro-geothermal. The largest single group of opponents also consists of retirees who have lived in the county for more than 6 years, but who own less than 10 acres. Nearly 60% of these people are anti-geothermal and 30% are undecided. Thus we see that much of the polarization in Cobb over geothermal development is composed of factions of retired, long term residents who differ only in the size of their land holdings.

Table 4 (No County Table).

The Interacting Influence of Three Demographic Variables
Upon Go-No Go Index

Cobb Survey

I have lived in						Sub Total		Total
14. Lake County	years	0-5		6-15		>15		
18. I own	Acres	<10	>10	<10	>10	<10	>10	
19. Employed Respondents								
Go		3	1	3	1	1	6	15
?		3	1	6	1	7	3	21
No Go		2	0	1	0	6	5	14
19. Retired Respondents								
Go		5	2	1	2	4	14	28
?		5	0	8	0	2	1	16
No Go		6	0	10	0	9	3	28
Sub Total								
Go		8	3	4	3	5	20	43
?		8	1	14	1	9	4	37
No Go		8	0	11	0	15	8	42
Total								
Go		11		7		25		43
?		9		15		13		37
No Go		8		11		23		42

Integers are Numbers of Respondents Total N = 122

Excluded from this Table are 11 respondents who marked "Other" on question 19, and 9 respondents who failed to answer at least one of the four questions involved.

Table 4 shows other interesting facts as well. Among employed respondents, opinions on the Go-No Go Index are nearly evenly split, but the bulk (50%) of the employed small land owners is undecided. And for the employed, length of residency seems to have a slightly stronger influence on Go-No Go than does

land parcel size. However, for retired people, the reverse is true: land parcel size is much more important in determining Go-No Go opinions than length of residence. We feel this is so in spite of the fact that newer, small land owning retired residents are essentially split (as are all new residents) on Go-No Go, while older, small land owning retired residents are clearly opposed.

Looking at this data another way, it is evident that for every category of length of residence, the size of land holdings is clearly more important than whether the person is employed or retired. When the data is analyzed in terms of the size of land holdings, opposing factors come into play. For small land owners, length of residence has a stronger effect on Go-No Go than whether or not they are employed or retired. Yet for large land owners whether one is employed or retired exerts more influence on Go-No Go than does length of residence.

Finally, since we pointed out that new residents lean slightly in favor, 6-15 year residents lean slightly in opposition, and long term residents are divided nearly equally, it is readily apparent that Cobb itself is evenly split on the question of Go-No Go for geothermal development.

A comparison of recreation activities in Table 5 shows essentially similar results as the county and south county. We note that a similar negative correlation coefficient ("R") appeared for hunters in all three samples. A comparison of possible influence of reasons for living in the county showed two interesting things. First of all, the correlation for those Cobb people living in the county for natural environment, recreation, and health was much stronger than either county-wide, or in the southern county. Secondly, polarization is again evident among those who live there for retirement, family and friends, housing and because they were born in the county.

Table 5 (County Table 4).

Recreational Activities and Reasons for Living in County

Influence on Go-NoGo Index

Cobb Survey

	% Go	"R"
20. Recreational Activity:		
Fish	33	.096
Hunt	49	-.117
Hike	31	.111
Camp	36	.028
Boat	33	.117
Swim	33	.085
Swim in Pools	25	.138
Observe Nature	31	.195
Golf	33	.088
Relax & Socialize	34	.126
21. Reasons for Living in Lake County:		
Born Here	50	-.041
Family & Friends	41	-.041
Employment	39	-.065
Retirement	38	.040
Natural Environment	26	.279
Recreation	22	.251
Health	22	.222
Housing	55	-.027
Averages	37	----

IV. Patterns of Support for Geothermal Development

Table 6 shows the correlation coefficients of possible influences of Go-No Go Index. In each case except two (Trust Companies and non-regulated development are compatible), the Cobb correlation is higher than countywide. And as in the county survey, the three highest correlations are with the perception of environmental impacts (25), expectation of increased jobs and tax revenues (2), and economic benefits greater than environmental costs (4).

Figure 3 depicts the Cobb "cube." Again we have designated four corner groups A, B, C, and D for discussion. In addition, we include a new group "E" as those 29 respondents who perceive environmental impacts, expect jobs and tax revenues to increase, but are undecided (or mixed) about going ahead with geothermal development.

Just as in the countywide sample of respondents, no perception of environmental impacts essentially insures the expectation of economic benefits and support for geothermal development. However, among those respondents who do perceive environmental impacts, only about one in six supports development and one in three not only opposes development but even doubts that it will bring economic benefits. The main differences from the countywide sample are the appearance of an "undecided" group E and, more importantly, the strong (proportional) shift from the more favorable to less favorable groups.

Table 6 (County Table 5).

Selected Correlations With Go-NoGo Index

Cobb Survey

Factor	"R" (with Go-NoGo)
2. Increase Jobs & Tax Revenues	.629
3. Trust Companies	.392
4. Benefits > Costs	.605
5. Nonregulated Development is Compatible	.300
11. Increase Property Values	.484
25. No Environmental Impacts Index	.657

Figure 3. Joint Distribution of Three Variables: (25) No Environmental Impacts Index; (24) Go-No Go Index; and (2) Increased Jobs and Tax Revenues. COBB SURVEY Total N=139.

V. The Gradation of Opinion

We next take a look at each group in the "cube" for comparison with the others and to chart the progression of changing opinions (see Table 7). The demographic factors pointed out in Section III are very apparent here. Table 7 shows that long time residents make up the bulk of the two extreme groups A and D, while newer residents tend to be the middle. It is also evident that the vast majority of staunch pro-geothermalites (group A) are large land owners, while small land owners make up greater than 70% of every other group. Again related to the length of residence in the county, retired respondents make up the bulk of both groups A and D while the middle groups are slightly more likely to be employed. Similar trends are also evident in the reasons people live in the county.

Attempting to explain the difference in the Go-No Go attitudes of groups B and C, who both see similar environmental and economic impacts, we found that a major shift on the question of leasing took place between groups A and B while the shift in the need for economic expansion and exploratory wells took place between B and C. Thus, group B, while being mostly undecided about leasing, still strongly favors economic expansion and exploratory drilling. Among group C, practically no one supports any of these propositions. So group B and C are differentiated more by their responses to questions 1 and 10 than by their responses to 9.

Table 7 also shows that groups A, B, and C have visited geothermal sites at the same rate, while the staunch anti-group D and the undecided group E have visited them less.

Table 7 (County Table 6).
Group Tabulations (Vertical % Yes)
Cobb Survey

	A (N=30)	B (N=13)	E (N=29)	C (N=13)	D (N=29)	Total Cobb (N=142)
20. Recreational Activities						
Fish	60	46	62	69	72	57
Hunt	43	23	28	15	24	26
Hike	57	23	62	77	66	58
Camp	33	46	35	62	38	37
Boat	30	31	21	54	48	36
Swim	33	77	59	46	62	52
Swim in Pools	30	46	62	39	48	45
Observe Nature	63	77	76	100	86	78
Golf	27	69	52	54	38	44
Relax & Socialize	70	92	86	100	90	85
21. Live in Lake County Because						
Born Here	13	8	3	0	10	7
Family & Friends	60	39	28	46	48	44
Employment	20	54	31	62	7	29
Retirement	47	31	38	31	59	46
Natural Environment	40	69	76	100	79	70
Recreation	10	54	45	62	59	44
Health	23	46	45	46	69	42
Housing	13	8	3	0	3	8
14. Live in Lake County						
0-5 years	13	54	31	23	17	25
0-15 years	13	8	45	39	17	27
>15 years	73	39	24	39	66	49
18. I Own						
<10 Acres	28	73	79	83	79	67
>10 Acres	72	27	21	17	21	33
19. I am:						
Employed	17	31	38	46	7	25
Self-Employed	13	15	10	15	14	13
Retired	60	39	41	31	72	54
Other	10	15	10	8	7	9
22. Visited Geothermal Site?						
Yes	83	85	66	85	62	72
No	17	15	35	15	38	28
23. Geothermal development should be:						
Prohibited	0	0	14	8	41	14
Closely Regulated	90	100	86	92	59	84
Unregulated	10	0	0	0	0	2
25. No Environmental Impacts Index						
Agree	100	0	0	0	0	23
?	0	0	0	0	0	8
Disagree	0	100	100	100	100	69
6. No Odor Impacts						
Agree	97	8	0	0	0	25
?	3	15	0	0	0	3
Disagree	0	77	100	100	100	72
7. No Noise Impacts						
Agree	97	0	3	0	0	27
?	3	0	0	0	0	2
Disagree	0	100	97	100	100	71

Table 7-Cobb (cont'd)

	A (N=30)	B (N=13)	E (N=29)	C (N=13)	D (N=29)	Total Cobb (N=142)
12. No Visual Impact						
Agree	87	0	0	0	0	23
?	3	8	7	0	0	4
Disagree	10	92	93	100	100	74
24. Go-NoGo Index						
Agree	100	100	0	0	0	37
?	0	0	100	0	0	30
Disagree	0	0	0	100	100	33
1. Economy Needs Expansion						
Agree	100	100	90	15	14	67
?	0	0	3	15	10	6
Disagree	0	0	7	70	76	27
9. Would Lease						
Agree	90	31	0	0	0	29
?	10	62	3	0	7	12
Disagree	0	8	97	100	93	59
10. Exploratory Wells be Drilled						
Agree	93	85	86	8	10	62
?	7	15	10	15	0	8
Disagree	0	0	3	77	90	30
2. Increased Jobs & Tax Revenues						
Agree	100	100	100	100	0	71
?	0	0	0	0	0	4
Disagree	0	0	0	0	100	25
3. Trust Geothermal Companies						
Agree	93	77	78	69	34	71
?	0	0	0	0	0	1
Disagree	7	23	22	31	66	28
4. Economic Benefits > Costs						
Agree	80	33	3	0	0	26
?	3	0	0	0	0	1
Disagree	17	67	97	100	100	74
5. Non-Regulated Development Compatible						
Agree	22	0	0	0	0	5
?	4	0	0	0	0	1
Disagree	74	100	100	100	100	94
8. Would Not Move						
Agree	97	62	24	8	17	50
?	3	15	10	0	7	6
Disagree	0	23	66	92	76	44
11. Increase Property Values						
Agree	70	8	7	23	0	21
?	13	8	3	0	0	11
Disagree	17	84	90	77	100	68

VI. The Perception of Environmental Impacts

In Section III we found that in Cobb, having visited a geothermal site correlates with having a favorable response to the Go-No Go Index (whereas for the county, there was no relationship.) This is paralleled by a similar though less marked relationship between having visited a geothermal site and perceiving fewer environmental impacts (see Table 8). Two explanations seem plausible: 1) a visit positively impresses the visitors, or 2) proponents are more likely to visit than opponents. We believe the latter effect to be more important because, as it turns out, 83% of the proponents have visited while only 67% of the opponents have done so. Controlling the visiting - perception of impacts relationship for Go-No Go response (bottom portion of Table 8) considerably weakens the relationship, supporting the second hypothesis and arguing against the first. The bottom portion of Table 8 also demonstrates that the bias effect which we found to be important countywide is not significant in Cobb. Thus we have a situation where, even though 72% of all Cobb respondents have visited facilities, which one might think should make them "authorities" on the subject of geothermal development and associated impacts, this fact does not correlate in the expected way with the Go-No Go Index or the perception of environmental impacts.

Since we found previously that the size of one's land parcel had a significant effect on whether one was pro- or anti-geothermal, we checked its influence in the interplay of visiting a geothermal facility and the perception of impacts. Table 9 shows a very interesting phenomenon. For small landowners, visiting a geothermal site is slightly correlated to perceiving less impacts while among large landowners, visitors perceive more impacts. Apparently, some large landowners (who may have once been predisposed to favor development) were not pleased by what they saw in the geothermal fields and this produced an opposition

to geothermal expansion.

Table 10 depicts some other factors which may have an effect upon the perception of impacts. Cobb has a generally parallel pattern to that of the county and south county. There are a couple of exceptions, however. We point out that swimmers (in natural bodies of water) are the recreation group most fearful of impacts, and even more so than swimmers county-wide. Furthermore, among reasons for living in the county, an odd reversal between employment and retirement took place in Cobb. Those respondents who live in the county for retirement (or are retired) see less impacts than do those who live for employment (or are employed). Those who live in the county for recreation see the most impacts of all, while large landowners and those who live in the county for reasons of housing are least likely to perceive impacts.

Table 8 (County Table 7).

Influence of Visiting a Geothermal Facility
Upon Go-NoGo Index and Perception of Environmental Impacts
Cobb Survey

Factor	(22.) Visited		% Agree	% ?	% Disagree	R
	Geo.	Facility				
24. Go-NoGo Index	Yes		43	26	31	.142
	No		23	40	38	
25. No Environmental Impacts Index	Yes		26	9	66	.086
	No		18	5	78	

Influence of Visiting a Geothermal Facility

Upon Perception of Environmental Impacts

Controlled for Go-NoGo Index

Cobb Survey

(24.) Control Response	(22.) Visited		% No Impacts	% ?	% Yes Impacts	R
	Geo.	Facility				
Go	83%	Yes	58	12	30	-.018
N = 52	17%	No	56	22	22	
?	62%	Yes	0	12	89	-.131
N = 42	38%	No	13	0	88	
NoGo	67%	Yes	3	3	94	.108
N = 46	33%	No	0	0	100	

Table 9 (No County Table).

Influence of Visiting a Geothermal Facility
Upon Perception of Environmental Impacts, Controlled
for Land Parcel Size

Cobb Survey

(18.) Control Response	(22.) Visited Geo. Facility	% No Impacts	% ?	% Yes Impacts	"R"
Own less than 10 acres N=91	Yes	14	9	77	.073
	No	9	6	85	
Own more than 10 acres N=44	Yes	43	8	49	-.165
	No	80	0	20	

Influence of Visiting a Geothermal Facility
Upon Go-No Go Index, Controlled for Land Parcel Size

Cobb Survey

(18.) Control Response	(22.) Visited Geo. Facility	% Go	% ?	% NoGo	"R"
Own less than 10 acres N=90	Yes	27	36	38	.123
	No	15	41	44	
Own more than 10 acres N=43	Yes	63	16	21	-.112
	No	80	20	0	

Table 10 (County Table 10).

Factors Relating to
The Perception of Environmental Impacts
Cobb Survey

	% Yes Impacts	"R"
20. <u>Recreational Activity</u>		
Fish	70	.016
Hunt	60	-.114
Hike	71	.040
Camp	77	.073
Boat	75	.082
Swim	81	.215
Swim in Pools	80	.168
Observe Nature	75	.145
Golf	76	.144
Relax & Socialize	73	.169
21. <u>Live in Lake County Because:</u>		
Born Here	50	-.095
Family & Friends	62	-.168
Employment	76	.077
Retirement	65	-.024
Natural Environment	78	.262
Recreation	84	.272
Health	82	.193
Housing	46	-.105
14. Live in County:		
0-5 years	74	
6-15 years	79	
>15 years	61	-
18. Own:		
<10 acres	80	
>10 acres	46	-.341
19. I am:		
Employed	76	
Retired	63	-
25. Average	69	-

VII. The Regulation of Geothermal Development

The question of regulation shows an expected response among Cobb people. Question 23 showed that 84% favored close regulation while 14% favored prohibition and only 2% called for non-regulation. Question 5 sustained this picture in that 94% felt that non-regulated development was not compatible with the present economy.

We attempted to determine the effects upon the support of regulation by Go-No Go (24) and Benefits greater than Costs (4) (see Table 11). Much the same result as in the county occurred, with the expected shift toward prohibition. It is significant that an equally high percentage (94%) favoring close regulation appeared for both those proponents who see benefits less than costs and also for those proponents who see benefits greater than costs. Apparently, those who see only good about geothermal development still want regulation as an insurance against error.

Table 11 (County Table 11).

Influence of Selected Responses*

to Go-NoGo Index and Benefits>

Costs (4) Upon the Support of Regulation (23)

Cobb Survey

Type of Regulation	Independent Variable Combinations				Total*
	Go	Go	No Op	NoGo	
	B>C	B<C	B<C	B<C	
Vertical Percentages					
Prohibited	0	0	15	30	---
Closely Regulated	94	94	85	70	---
Un-Regulated	6	6	0	0	---
TOTAL	100	100	100	100	---
Horizontal Percentages *					
Prohibited	0	0	32	68	100
Closely Regulated	26	14	29	27	96
Un-Regulated	67	33	0	0	100
N	32	17	39	44	132

*Figures do not necessarily sum to 100% due to omission of data for 5 respondents of various other combinations of the independent variables.

VIII. The Willingness to Lease for Geothermal Development

In analyzing the willingness to lease among Cobb respondents, we again confronted the problem of the interpretation of question 9 as discussed in the county survey. It appears most likely that the respondents chose to answer question 9 in terms of whether they would lease the land that they actually own--opposite to that of the county respondents. We conclude this is based upon large differences in the willingness to lease between Cobb respondents who own large parcels vs. small, or old vs. new residents, or those who do or do not own their mineral rights. Specifically, while 63% of the large landowners would lease, only 11% of the small landowners would do so. This different interpretation is reasonable because Cobb respondents live in the immediate area of development and many have already leased or have been approached to lease. Such people would not look upon the question of leasing in a philosophical sense. For this reason we chose to divide the Cobb respondents by land parcel size for further analysis. The small landowners are retained in the tables because their views concerning leasing their land might become important if unitization of the Valley is proposed (as has happened in Anderson Springs).

We found stronger correlations in Cobb than for the county for almost every possible factor that we examined (see Table 12). The only lower one was for Trust in the Companies (3). The most significant increase appeared for land parcel size. However, in Cobb, as in the county survey, the perception of environmental impacts was still the most important. In fact, if we compare these correlations to those for the county and south county, it becomes evident that as one progresses from a county-wide analysis to an area specific analysis, the perception of environmental impacts becomes more and more important.

Among the large landowners, the perception of environmental impacts and, in particular, the perception of odor and noise, is seen to have by far the

Table 12 (County Table 12).

Various Factors Influencing

The Willingness to Lease

for Geothermal

Cobb Survey

	(9.) Willing to Lease		
	% Yes	% ?	% No
17. Mineral Rights Ownership			
Total Cobb	29	12	59
By Self	30	7	63
By Others	13	25	63
Don't Know	44	26	30
Not Applicable	7	14	79

Correlations to Willingness to Lease (9.)	Cobb N ≈ 142 R	Controlled for parcel size	
		< 10 acres "R" N ≈ 91	> 10 acres "R" N ≈ 44
18. Land Parcel Size	-.427	----	----
14. Length of Residence	-.149	-.008	.107
21. Live ... for Employment	-.015	-.075	-.003
21. Live ... for Natural Env.	.283	.226	.384
21. Live ... for Recreation	.245	.189	.360
21. Live ... for Health	.185	.169	.134
22. Visit Geothermal Facility	.201	.192	-.101
3. Trust Geothermal Companies	.234	.051	.616
11. Increase Property Values	.653	.495	.671
6. No Odor Impacts	.739	.519	.823
7. No Noise Impacts	.712	.526	.820
12. No Visual Impacts	.639	.499	.681
25. No Environmental Impacts Index	.733	.568	.795

highest correlation with willingness to lease. The expectation of increased property values and trust of the geothermal companies also correlates strongly with the willingness to lease. In all these cases, the correlations are stronger than among small landowners, or among our countywide sample. The correlations with living in the County for reasons of natural environment and recreation are also stronger among large landowners.

It is worthy of note that visiting a site had even a stronger positive influence on the willingness to lease among Cobb respondents than for the county. But when we controlled for large and small land owners, we found the same curious situation that appeared in Section VI: a visit to a geothermal site makes small land owners more willing to lease, yet it makes large land owners less willing (see Table 13).

Table 13 (No County Table).

Effect of Visiting a Geothermal
Facility Upon the Willingness to Lease,
Controlled for Land Parcel Size

Cobb Survey

(18.) Controlled Response	(22.) Visited a Geo. Site	(%) Willing to Lease			"R"
		% Agree	% ?	% No	
Own less than 10 acres N=90	Yes	16	18	66	.192
	No	3	12	85	
Own more than 10 acres N=43	Yes	61	5	34	- .101
	No	80	0	20	

IX. Conclusions

Cobb opinions differ from the strong support given geothermal development countywide in that they are essentially split into three equal camps: pro-, anti-, and undecided (or mixed). A factor that influences the large division is the size of one's land holdings. Large land owners strongly favor development and small ones generally oppose it.

As found in the county survey, the fear of environmental impacts also has a strong influence on opinions regarding development. But despite Cobb respondents' higher tendency to visit geothermal facilities, visiting these facilities does not correlate in the expected way of producing a greater fear of impacts, less support for geothermal development, and less willingness to lease. When all groups are lumped together, this relationship is caused by the fact that a higher percentage of proponents have visited geothermal facilities than opponents. This differs from the explanation of the same phenomenon for the county in that for the county as a whole, proponents far outnumber opponents, even though both groups visited the facilities at the same rate.

However, large landowners who have visited facilities see more impacts, are less supportive of development, and even less willing to lease than their non-visiting counterparts. Apparently, for some large landowners, a visit to a geothermal site has a disquieting effect.

We have produced Figure 4 for Cobb which shows a chart of possible future opinion distributions based upon changing perceptions of economic and environmental impacts which can be compared to that for the county. As can be seen, there is a similar, if not more dramatic, drop-off of support for the three propositions as the expectation of economic benefits decreases and the fear of environmental impacts increases. When compared to the county, it is apparent that Cobb is "further down the road" in terms of perception of deteriorating

Possible Perceptions
of General Future
Conditions

Non Environ.
Impacts —
Increased Jobs
& Tax Revenues
N = 33

Undecided About
Environ. Impacts —
Increased Jobs
& Tax Revenues
N = 11

Environ. Impacts
Will Occur —
Increased Jobs
& Tax Revenues
N = 55

Environ. Impacts
Will Occur —
No Increased Jobs
& Tax Revenues
N = 36

Figure 4. (County Figure 6). Possibilities of Future Public Opinion as Functions of Changes in the Perception of Economic and Environmental Impacts. COBB SURVEY

conditions as postulated in Figure 4. Thus one sees the obvious possibility that attitudes toward development may be a function of the respondent's distance from the development, within a close range. We chose a small distance since the southern portion of the county survey did not show anywhere near as much variance from the county-wide data as did Cobb. If such is the case, each locality in Lake County may experience gradual shifts of opinions similar to Cobb as development approaches. Of course this depends upon the degree of repetition of changing attitudes, local demographic characteristics, the state of technology, and also upon whatever regulatory policies are put into effect by the county.

Finally, we have found that even though one-third of the Cobb respondents favor geothermal development, even these people, as well as the rest, almost unanimously support strict regulation of the industry.

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Appendix A. Technical Appendix

The qualifications of the questionnaire presented in the county survey apply also for the Cobb survey. We refer the reader to Appendix A of the county survey for discussion.

In addition, we feel moved to offer additional comment upon the questionnaire and its interpretation in relation to the unique characteristics of the Cobb sample. Some Cobb respondents have criticized the questionnaire and have indicated they answered questions 1 and 10 positively even though they strongly oppose geothermal development and exploratory drilling in Cobb Valley. They object to their statistical inclusion into a "Go-No Go" Index which might be interpreted as support for geothermal development, perhaps even in Cobb Valley, and likewise may overstate the extent of the actual support given. Yet, many of these people are fearful of being publically called "anti-geothermal" and go to great lengths to insist they do not oppose geothermal development outside populated areas. They are critical of the survey and statistical process and yet felt they should have been tabulated as "anti-geothermal."

We acknowledge the concern and also the disappointment that the questionnaire was not more comprehensive. But we feel it necessary to reply: First of

all, if some respondents felt obliged to answer positively to questions 1 and 10 while at the same time inwardly considering themselves "anti-geothermal" (and thus not properly represented in the tabulations), we point out that still one-third of the Cobb respondents did answer questions 1 and 10 negatively. There are many Cobbites who do not want any economic expansion of any kind, or any exploratory wells any place in the county. So those "inwardly" anti-geothermal respondents who are statistical "Go's" are not the extreme anti-geothermal segment of the Cobb population. Because of the fact that they would approve of geothermal development elsewhere, makes them by our definition, much more of a "moderate" on this question.

We point out that 30% of the Cobb sample was "undecided" in the Go-NoGo Index (compared to only 16% for the county). Since the Go-NoGo index is an average of questions 1, 9, and 10, to say one is "undecided" is not entirely accurate unless one answered "undecided" to all three questions. Statistically, the highest number of actual "undecideds" that could result from the Cobb Go-NoGo averaging was only 6%. The fact that 30% ended up in the middle of the Go-NoGo index indicates much more of a "cross-mixing" of responses than complete ambivalence to the Go-No Go index. Thus the middle response to the Go-No Go index more accurately depicts a mixed (or highly conditional) response to the Go-No Go index, which we feel ties in quite closely to verbal comments and criticisms we have received of the questionnaire.

Secondly, geothermal development is a highly geographical issue. There is much more likelihood of opposition to development in "one's own backyard" than far off where no one lives. Because the questionnaire was the first attempt to tap attitudes county-wide, there was no possibility to check attitudes as a function of all the possible individual geographical or environmental objections that could be raised to any one project. Instead, it was an attempt

to get a feeling of the attitudes about geothermal development in general, anywhere (or somewhere) in Lake County. A person could rightly respond positively to all three questions (1, 9, and 10) yet rightly oppose development 2, 5, or 10 miles from his residence. These two responses are not contradictory. The finer resolutions of attitudes are beyond the scope of this questionnaire. But had the survey uncovered general opposition to development, this could have been interpreted as support for a general ban on all geothermal operations, much like the approach Napa County has taken.

The questionnaire that was used in Cobb was identical to the one used in the county survey. Some people in Cobb may have thought the Cobb questionnaire was supposed to tap public opinion concerning geothermal development in Cobb. Instead, the proper concept was public opinion in Cobb concerning geothermal development (somewhere) in Lake County. To the degree that Cobbites felt the reference was to geothermal development in or near Cobb Valley, the results of the Cobb survey could actually overstate their opposition to geothermal development in Lake County.

Finally, the ability of a questionnaire to be able to tap all of the complexities and nuances of any political issue is quite limited. Unfortunately, for statistical analysis, many issues have to be paired down to "either-or" dichotomies. No real attempt was made to approach the finer questions of the extent and manner of possible environmental controls and regulations due to the tremendous complexity of the situation. Instead, only a general reaction to the need for any regulation was sought. Certainly these other complex issues are important, and ultimately will decide the extent and nature of the development and its accompanying social and economic reactions (i.e., moving out of the county, etc.). These items are better left to the determination of elected and county officials.

Appendix B. Demographic Statistics

Demographically, Cobb is somewhat different from the county. (see Tables 1 and 2) These differences are confined to elements of length of residency, mineral status, and employment/retirement. Nearly one half of Cobb respondents had lived in the county more than 15 years, compared to one-third for the county. More Cobbites know they own their own mineral rights, and more Cobb respondents were retired than county wide.

Significantly, the distribution of land parcel sizes was not much different than for the county, but as we have found, this distribution has important influences upon attitudes, which is not the case in the county or southern county. In addition, as Table 14 shows, there is a stronger tendency than in the county for large landowners in Cobb to know they own their mineral rights. Even though we found a very strong relationship between land parcel size and Go-No Go (see section III) along with moderate influences from employment/retirement, these two demographic variables do not have a strong interrelationship between themselves.

As far as recreational patterns in Cobb, it is interesting that while fishing and boating are generally less popular than in the county (see Table 15) all types of swimming are more popular. Cobbites find hunting somewhat less popular, while finding golfing much more so. The reasons Cobbites live in the county vary slightly from those of the county respondents; these differences are obvious from comparisons of the two Table 15's.

The final item of analysis is the changing importance with time of recreation patterns and reasons for living in the county (Table 16). The middle, or 6-15 year resident group, contains a perplexing assortment of motivations. We find that this group, compared to longer and shorter term residents, lives in the county less because of family and friends and health, and more for recreation

and retirement. In addition, they fish, camp, and swim less. All this really says is that there are not steady trends in Cobb. In fact, the most significant item in the table perhaps is that Cobb residents who have lived in the county longer than 15 years own the larger parcels, while newer residents own smaller ones.

Table 14 (County Table 14).

Various Relationships of Mineral Ownership,

Land Ownership, and Employment

Cobb Survey

		(17.) Mineral Rights Owned:				N
		By Self	By Others	Don't Know	Not Applicable	
18.	Own < 10 Acres	62	7	19	12	133
	Own > 10 Acres	82	2	11	5	
19.	I am:					
	Employed	69	4	12	15	139
	Retired	67	8	18	7	

(18.) Land Parcel Size

		Own < 10 Acres	Own > 10 Acres	N
19.	I am:			
	Employed	64	36	135
	Retired	69	31	

Table 15 (County Table 15).

Recreational Patterns and Reasons for
Residence of Employed and Retired
(% Responding "Yes")

Cobb Survey

	Employed N = 53	Retired N = 76	Total N = 142
20. <u>Type of Recreation</u>			
Relax & Socialize	81	86	85
Fish	51	62	57
Observe Nature	74	79	78
Boat	34	38	36
Swim	59	45	52
Camp	53	25	37
Hike	72	49	58
Hunt	25	29	26
Swim in Pools	49	40	45
Golf	43	45	44
21. <u>Reasons for Living in County</u>			
Natural Environment	72	68	70
Retirement	6	80	46
Recreation	43	42	44
Family & Friends	53	37	44
Employment	59	5	29
Health	36	51	42
Housing	4	12	8
Born Here	9	3	7

Table 16 (County Table 16).

Demographic Trends in Lake County

(% Responding Yes)

Cobb Survey

(14.) Length of Residency in Lake County			
	0-5 years	6-15 years	>15 years
	N = 35	N = 38	N = 64
<hr/>			
21. <u>Reasons for Living in County</u>			
Born Here	0	0	15
Family & Friends	43	16	61
Employment	37	26	26
Retirement	46	55	41
Natural Environment	66	71	71
Recreation	46	50	41
Health	46	34	45
Housing	6	8	9
20. <u>Recreational Activities</u>			
Fish	66	45	59
Hunt	14	21	35
Hike	54	50	64
Camp	40	21	45
Boat	37	42	32
Swim	54	50	52
Swim in Pools	60	34	44
Observe Nature	74	74	81
Golf	57	68	25
Relax & Socialize	89	92	78
16. Home Owner	89	97	91
17. Owns Own Mineral Rights	49	66	77
Don't Know Mineral Status	33	21	6
18. Own < 10 Acres	87	89	46
19. Employed	37	32	41
Retired	51	58	52
22. Have Visited a Geothermal Site	54	71	81