

Food Violations Report

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Abstract

Health violations in facilities are one of the biggest concerns of California's government. A bunch of inspections were processed in a wide range of restaurants and a set of data (inspections and violations) are created based on those activities. By using that data, the report detects that in overall, the average number of food violations per month are not stable but having downward trend. However, it also shows the fact that non-food things were received the less attention from most of restaurants and they created the most proportion in health violations. Furthermore, the statistic in some postal codes and the comparison of two famous brands (McDonald and Burger King) are given to get diverse views for the state of food violations in California.

Introduction

The purpose of the report is to show how food inspections and health violations in California's facilities are managed. It also helps government gain better understanding of the current situation so that they can set more actions and improvements later. The report is structured into two parts. The first part of report describes the way data is processed and stored in related database. The last part involves how data is analyzed where tables and plots are used to give the overall numbers as well as the trend over periods for restaurant's violations.

The collection of inspections and violations data from July 2015 to December 2017 is used in this report and it is kept in database as described in following database structure.

Database Structure

There are 2 main tables: Inspections and Violations in database schema.

Inspections

```
CREATE TABLE Inspections
(
    ActivityDate          datetime,
    EmployeeId           varchar(50) NOT NULL,
    FacilityAddress       varchar(256),
    FacilityCity          varchar(256),
    FacilityId           varchar(10),
    FacilityName          varchar(256),
    FacilityState         varchar(10),
    FacilityZip           varchar(20),
    Grade                varchar(5),
    OwnerId              varchar(20),
    OwnerName            varchar(256),
    PEDescription         varchar(256),
    ProgramElementPE     int,
    ProgramName           varchar(256),
    ProgramStatus        varchar(20),
    RecordId             varchar(20),
    Score                int,
```

```

        SerialNumber      varchar(10),
        ServiceCode       int,
        ServiceDescription varchar(30),
        CONSTRAINT PK_Inspections PRIMARY KEY (SerialNumber)
    );

```

Violations

```

CREATE TABLE Violations
(
    Points          int,
    SerialNumber    varchar(10),
    ViolationCode   varchar(5),
    Description     varchar(256),
    Status         varchar(20),
    CONSTRAINT PK_Violations PRIMARY KEY (SerialNumber, ViolationCode),
    CONSTRAINT FK_SerialNumber FOREIGN KEY(SerialNumber) REFERENCES
                                                Inspections(SerialNumber)
);

```

In Inspections table, the field SerialNumber is chosen as primary key. Each time a facility is inspected, a new SerialNumber is generated to keep track for that record.

With Violations, the primary key is a combination between SerialNumber and ViolationCode , SerialNumber should be a foreign key to Inspections table. There are some Violations with “missing” SerialNumber in Inspections (the samples are listed in Table 1) therefore removal of them after inserting data is a necessary cleaning step in data preprocessing. (The option `PRAGMA foreign_keys = ON;` can be used but experiments showed that checking the existence of SerialNumber in Inspections table before inserting takes more time, hence I go with DELETE command option after inserting).

Table 1. Invalid SerialNumber foreign key samples

2	DAX2XF9F0	F007	# 07. Proper hot and cold holding temperatures	OUT OF COMPLIANCE
0	DAX2XF9F0	F049	# 50. Impoundment of unsanitary equipment or food	OUT OF COMPLIANCE
4	DADMZNE4D	F014	# 14. Food contact surfaces: clean and sanitized	OUT OF COMPLIANCE
1	DADMZNE4D	F026	# 26. Approved thawing methods used, frozen food maintained frozen	OUT OF COMPLIANCE
1	DADMZNE4D	F039	# 39. Wiping cloths: properly used and stored	OUT OF COMPLIANCE

Besides, the data in Violations worksheet contains duplicate records for SerialNumber and ViolationCode. It can be caused by some mistakes when collecting data, so I eliminated them by using INSERT OR IGNORE command. That means when inserting, if primary constrain is invalid, that record will be ignored. The examples in Table 2 below give more details for this problem.

Table 2. Duplicate SerialNumber And ViolationCode Samples in Violations Sheet

2	DA7XLSCMN	F001	# 01a. Demonstration of knowledge	OUT OF COMPLIANCE
2	DA7XLSCMN	F001	# 01a. Demonstration of knowledge	OUT OF COMPLIANCE
2	DAZULLZ7F	F009	# 09. Proper cooling methods	OUT OF COMPLIANCE
2	DAZULLZ7F	F009	# 09. Proper cooling methods	OUT OF COMPLIANCE

Violation counts

905885 violations are found after 191371 inspections are processed. These violations are separated into 116 distinct Violation Codes. The Table 3 gives the statistic of violations by their code, description and the number of each type.

Table 3. Summary of violation codes.

Code	Description	Count
F044	# 44. Floors, walls and ceilings: properly built, maintained in good repair and clean	102009
F033	# 33. Nonfood-contact surfaces clean and in good repair	100080
F035	# 35. Equipment/Utensils - approved; installed; clean; good repair, capacity	80010
F040	# 40. Plumbing: Plumbing in good repair, proper backflow devices	50868
F036	# 36. Equipment, utensils and linens: storage and use	49742
F037	# 37. Adequate ventilation and lighting; designated areas, use	48042
F043	# 43. Premises; personal/cleaning items; vermin-proofing	42943
F007	# 07. Proper hot and cold holding temperatures	41105
F030	# 30. Food properly stored; food storage containers identified	39854
F039	# 39. Wiping cloths: properly used and stored	35845
F014	# 14. Food contact surfaces: clean and sanitized	34441
F006	# 06. Adequate handwashing facilities supplied & accessible	33952
F023	# 23. No rodents, insects, birds, or animals	29722
F034	# 34. Warewashing facilities: Adequate, maintained, properly use, test strips available	19208
F052	# 01b. Food safety certification	18359
F029	# 29. Toxic substances properly identified, stored, used	17986
F027	# 27. Food separated and protected	17866
F042	# 42. Toilet facilities: properly constructed, supplied, cleaned	16153
F046	# 46. Signs posted; last inspection report available	15735
F025	# 25. Personal cleanliness and hair restraints	11878
F038	# 38. Thermometers provided and accurate	11060
F009	# 09. Proper cooling methods	7993
F026	# 26. Approved thawing methods used, frozen food maintained frozen	7798
F001	# 01a. Demonstration of knowledge	6874
F021	# 21b. Water available	6786
F032	# 32. Food properly labeled & honestly presented	6734
F049	# 50. Impoundment of unsanitary equipment or food	5926
F048	# 47. Permits Available	5510
F005	# 05. Hands clean and properly washed; gloves used properly	5151
F013	# 13. Food in good condition, safe and unadulterated	5009
F041	# 41. Garbage and refuse properly disposed; facilities maintained	4742
F008	# 08. Time as a public health control; procedures & records	4706
F053	# 21a. Hot Water Available	4218
F004	# 04. Proper eating, drinking, or tobacco use	3364
F050	# 51. Permit Suspension	2950
F022	# 22. Sewage and wastewater properly disposed	1636
F055	# 01a. Demonstration of knowledge	1515
F054	# 52. Multiple Major Critical Violations / Increased Risk to Public Health	1214
F016	# 16. Compliance with shelf stock tags, condition, displayed	1087
F024	# 24. Person in charge present and performs duties	983

F011	# 11. Proper reheating procedures for hot holding	854
F031	# 31. Consumer self service facilities properly constructed and maintained	669
F015	# 15. Food obtained from approved source	622
F047	# 48. Plan Review required for new or remodel construction	607
F045	# 45. Sleeping quarters	437
F019	# 19. Consumer advisory provided for raw or undercooked foods	255
F018	# 18. Compliance with variance, specialized process, & HACCP Plan	213
F028	# 28. Fruits and vegetables washed as required	207
F058	# 19. Consumer advisory provided for raw or undercooked foods	185
W048	Permits Available	121
F010	# 10. Proper cooking time & temperatures	51
F017	# 17. Compliance with Gulf Oyster Regulations	44
F057	# 18. Compliance with variance, specialized process, & HACCP Plan	43
W009	Cockroaches	42
F051	# 49. Samples Collected	40
F002	# 02. Communicable disease; reporting, restrictions & exclusions	38
F003	# 03. No discharge from eyes, nose, and mouth	36
W053	Permit Suspension	35
W051	Walls, Floors, Ceilings: approved, maintained clean and in good repair	32
W052	Equipment, Shelving, Cabinets: approved, maintained clean and in good repair	31
F012	# 12. Returned and reservice food	28
W023	Floor maintained clean	23
W017	Hot and cold water available	18
W019	Plumbing approved and maintained in good repair.	15
W050	Food properly labeled	14
F056	# 10. Proper cooking time & temperatures	12
W005	Food elevated	11
W001	Proper hot and cold holding temperatures	9
W020	Wall(s) maintained clean	9
W042	Garbage / Rubbish receptacles approved type	7
W047	Thermometer: available, maintained in good repair	7
W003	Food storage separated and protected	6
W008	Rodent	6
W021	Wall(s) maintained in good repair	6
W041	Premises maintained clean and sanitary	6
W014	Fly Breeding	5
W024	Floor maintained in good repair	5
W027	Ceiling constructed of smooth, durable, and non-absorbent material	5
W049	Food from an approved source	5
W029	Toilet maintained clean / sanitary	4
W031	Hand sink maintained clean / sanitary	4
W034	Toilet room with toilet paper / soap / towels / trash receptacle	4
W044	Garbage / Rubbish receptacles maintained clean and sanitary	4

W004	Food storage space	3
W012	Fly Breeding Material	3
W016	Building rodent proof	3
W018	Waste water or sewage properly disposed or not discharged on the ground.	3
W026	Ceiling maintained in good repair	3
W028	Toilet in good repair	3
W032	Toilet room floor / walls / ceiling in good repair	3
W043	Garbage / Rubbish receptacles maintained in good repair	3
W006	Food packaging protected	2
W011	Storage of materials 18 inches above the floor.	2
W025	Ceiling maintained clean	2
W033	Toilet room floor / walls / ceiling clean	2
W035	Toilet room well ventilated	2
W036	Toilet room well lighted	2
W040	Compliance with shellfish tag requirements	2
CL21	Public Health Permit/License valid	1
F020	# 20. Licensed health care facilities/public & private schools; prohibited foods not offered	1
MF07	# 07. Adequate handwashing facilities supplied & accessible	1
MF42	# 42. Garbage and refuse properly disposed; facilities maintained	1
SF15	No Health Code Violations Observed At The Time Of Inspection	1
SS33	Garbage / rubbish receptacles not maintained clean and sanitary	1
W002	Food in good condition, safe and unadulterated	1
W022	Wall(s) constructed of approved material	1
W030	Hand sink in good repair	1
W037	Toilet available	1
W038	Hand sink available	1
W039	Proper storage or use of hazardous materials	1
W045	No unapproved sleeping accommodations	1
W046	Live animals	1
WP13	# 13. Disease Transmission - Carrier / Lesion / Rash	1
WP15	# 15. Tobacco / Eating / Drinking / Habits / Behaviors	1
WP16	# 16. Hair Restraints / Outer Garments / Nails / Rings	1
WP18	# 18. Personal Hygiene	1
	Total Violations	905885

As can be observed from the table, the non-food things were the most violated problems. The top 3 are “F044-# 44. Floors, walls and ceilings: properly built, maintained in good repair and clean”, “F033-# 33. Nonfood-contact surfaces clean and in good repair”, “F035-# 35. Equipment/Utensils - approved; installed; clean; good repair, capacity” with the total 102.009,

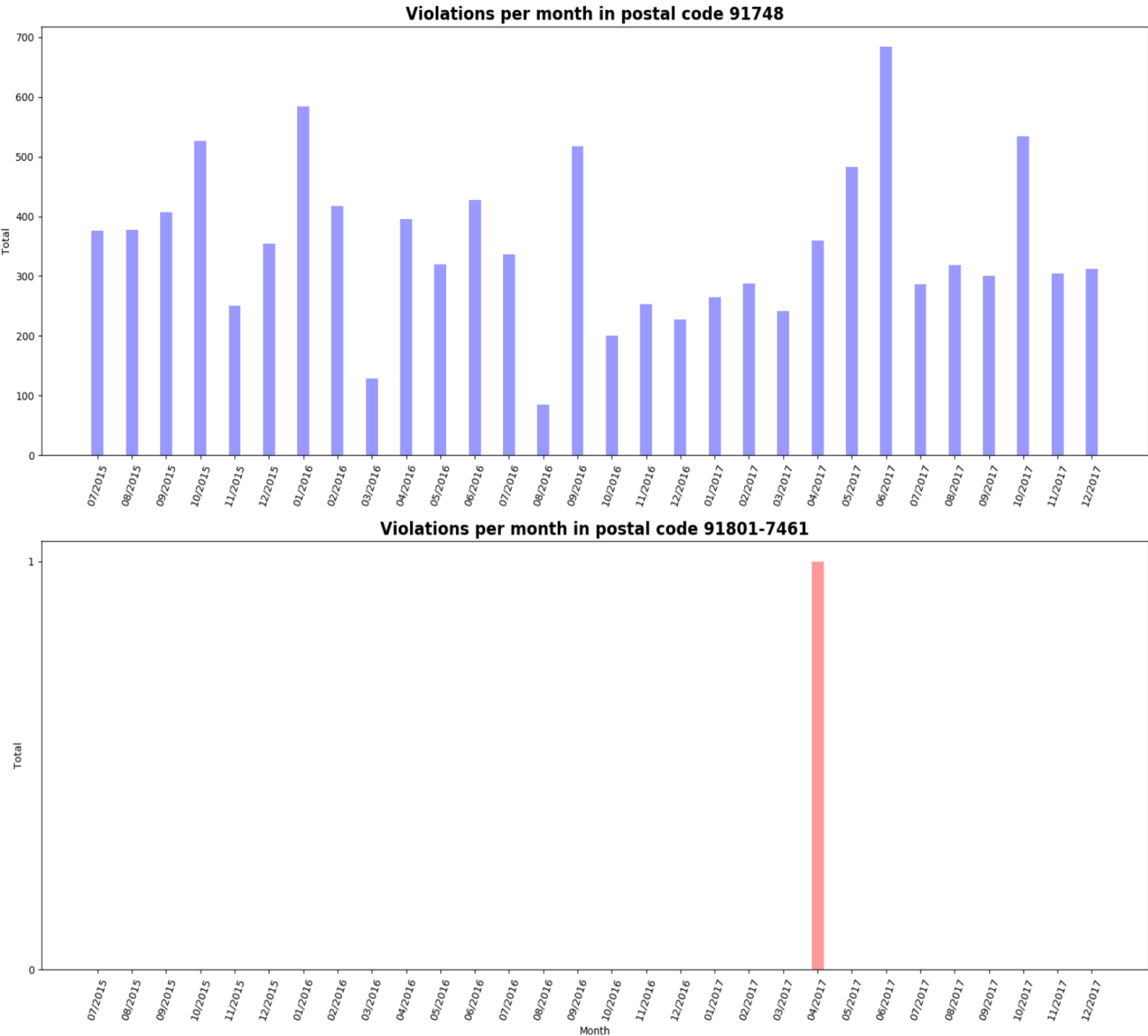
100.080 and 80.010 respectively. Besides, there were about 39 codes with above 1000 number of violated times. That means many facilities had same issues or these kinds of issues were not solved completely from previous inspections. The government should give some more punishments or warnings to help improving the awareness of the facilities in those stuffs.

Violations over time

Highlight Postal Codes

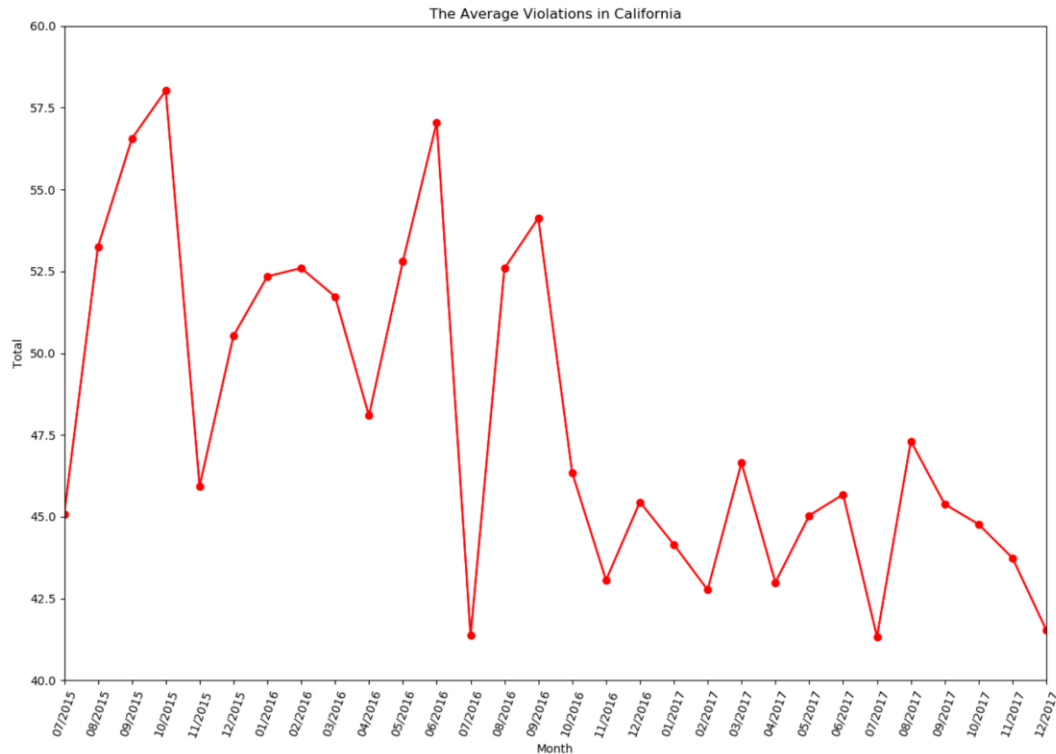
The facilities in 3.037 postal codes were inspected from July 2015 to December 2017. During this period, the highest number of violations were detected in postal code **91748** with 10.564 times. That number was summarized after 2011 inspections were processed in 494 facilities. Especially, the violations in this postal code reached the peak on June 2017 with nearly 700 times. In the contrast, about 51 postal codes having only 1 violation during same period were found. The following Figure 1 shows the trending of violations in postal code **91748** and **91801-7461** (one of the postal codes have lowest rate of food violations).

Figure 1. Trending of food violations in 91748 and 91801-7461 postal codes.



Average Violations in California

Figure 2. The average violations in California

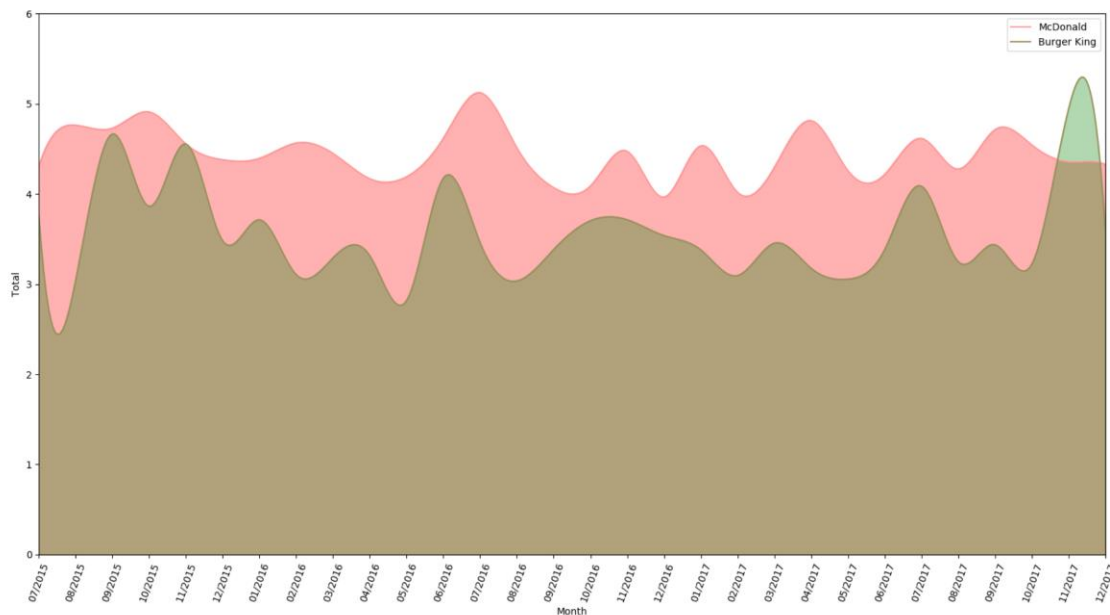


The average violations per month are calculated by getting the division between total numbers of violations and total numbers of postal codes which violations are detected inside those. Overall, this number had downward trend in California. Starting with 45 times on July 2015, it raised and reached the peak on October 2015 with about 58 times per month. Then, it fluctuated in the range between 41 and 57 times per month from last months of 2015 to the end of 2016. This trend became more steady from 2017 with approximate 43 times per month.

McDonalds vs Burger Kings

Fast food is convenient and delicious. However, because the dishes need to be prepared very fast, it can be the reason for a lot of food violations. To give an example of it, the violations of McDonalds and Burger Kings are compared in Figure 3.

Figure 3. Comparison between McDonalds and Burger Kings



According to the chart, the average number of violations in McDonalds were often higher than in Burger Kings. During the time from 07/2015 to 12/2017, government processed 1529 inspections in 345 different branches of McDonalds with 6600 violations were detected. Per month, about 50 McDonald restaurants were inspected and approximate 220 issues were found which creates the mean for whole period is 4.4 times.

In the meanwhile, Burger King had less stable trend. In each month, the average number of examined restaurants were 19. With 1992 violations in total, there were about 66.4 violations per month. That means for each inspection in Burger King chain, above 3.5 mistakes were discovered.

Appendix

Appendix 1: Food Violations

Code	Description
F012	# 12. Returned and reservice food
F013	# 13. Food in good condition, safe and unadulterated
F014	# 14. Food contact surfaces: clean and sanitized
F015	# 15. Food obtained from approved source
F019	# 19. Consumer advisory provided for raw or undercooked foods
F020	# 20. Licensed health care facilities/public & private schools; prohibited foods not offered
F026	# 26. Approved thawing methods used, frozen food maintained frozen
F027	# 27. Food separated and protected
F030	# 30. Food properly stored; food storage containers identified
F032	# 32. Food properly labeled & honestly presented
F033	# 33. Nonfood-contact surfaces clean and in good repair
F049	# 50. Impoundment of unsanitary equipment or food
F052	# 01b. Food safety certification
F058	# 19. Consumer advisory provided for raw or undercooked foods
W002	Food in good condition, safe and unadulterated
W003	Food storage separated and protected
W004	Food storage space
W005	Food elevated
W006	Food packaging protected
W049	Food from an approved source
W050	Food properly labeled

Appendix 2: Top 40 most violated facilities

Name	Total
DODGER STADIUM	1140
STAPLES CENTER (LEVY)	845
LA COLISEUM	693
UNIVERSAL STUDIOS HOLLYWOOD	417
SIX FLAGS MAGIC MOUNTAIN & SIX FLAGS HURRICANE HARBOR	372
STUB HUB CENTER	309
LA CONVENTION CENTER	283
LMU	282

TERRANEA	220
SUPER H MART	179
LA ZOO	165
ZION MARKET DELI & ISLAND	162
VALLARTA SUPERMARKET #27	152
LA FIESTA MARKET	147
QANTAS AIRWAYS LOUNGE	145
VALLARTA SUPERMARKET #17	144
USC GALEN CENTER	142
168 MARKET #806	142
BUY LOW MARKET	142
BAJA RANCH SUPERMARKET-DEFBK	141
SODEXO @ THE HOLLYWOOD BOWL	141
NORTHGATE GONZALEZ MARKET #25	140
VALLARTA SUPERMARKET #9	140
BAJA RANCH MARKET-DELI/BAKER	139
WHOLE FOODS MARKET #29	139
BAJA RANCH SUPERMARKET	137
REG BEV WILSHIRE	135
SUPERIOR GROCERS	134
99 RANCH MARKET	133
AMAPOLA DELI & MARKET	131
AMERICAN RANCH & SEAFOOD MKT	129
HAZEL MEAT MARKET	129
SUPER A FOODS	128
RALPHS MARKET #648	128
RALPHS MARKET #759	128
SEAFOOD CITY NORTH HILLS	128
168 MARKET #805	128
BRISTOL FARMS MARKET #21	127
FORUM	126
CANDELARIO'S MARKET	123