

Saratoga CERT Radio Communications Plan

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Introduction

This document describes the plan for radio communications in the event of a disaster or other emergency that requires the activation of Saratoga CERT teams.

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SARATOGA CERT RADIO COMMUNICATIONS PLAN

1.0 CERT RADIO COMMUNICATIONS OVERVIEW

CERT personnel in the field use FRS radios to communicate with each other and with the Division Leader using FRS frequencies. The Division Leader or designee is paired with a licensed amateur radio operator. The amateur radio operator provides the communications link from the CERT Division Leader to the Saratoga City EOC, or to other CERT teams, using amateur radio frequencies. Amateur radio frequencies are also used to communicate from the City EOC to the Supply Bases and any other entities. The generic Saratoga CERT radio communications connectivity is shown in Fig. 1.

The Saratoga EOC communicates with the Santa Clara County EOC on a Public Safety frequency pair. Amateur radio equipment located at the Saratoga EOC provides backup communication to an amateur radio station located at the County EOC. This amateur radio link is capable of transmitting both voice and digital (packet) data.

There may eventually be a link between the Saratoga EOC and the Regional OES via amateur radio. This capability has not yet been defined or implemented.

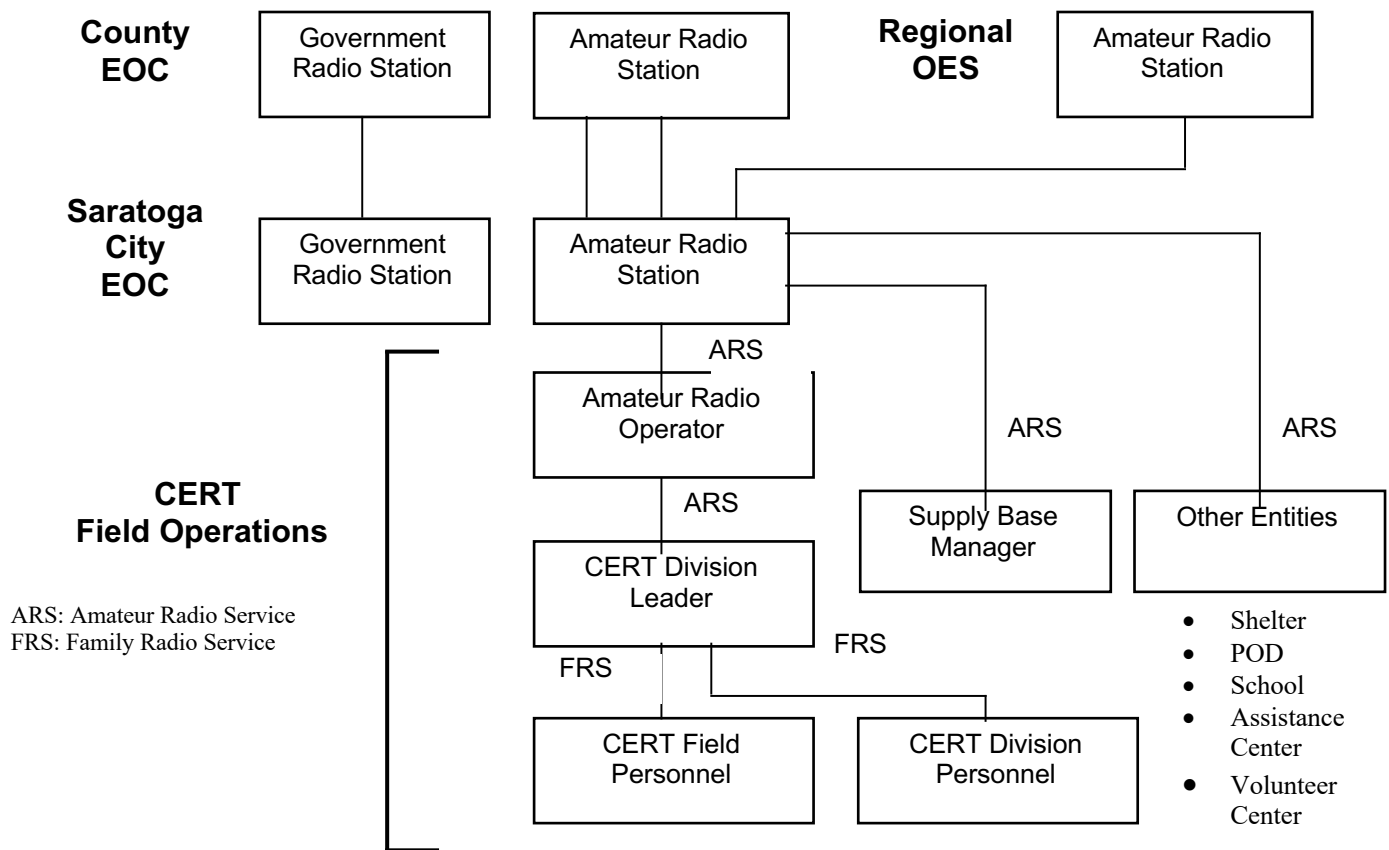


Fig. 1. Saratoga CERT radio communications links

Saratoga has two EOCs. The primary EOC is located at the City offices on Allendale avenue. The alternate EOC is at the fire station in downtown Saratoga. The two are fully equipped with amateur radio and EOC-to-EOC communications equipment.

2.0 IMPLEMENTATION

The CERT communication concept described above utilizes CERT communicators using FRS radios on UHF frequencies under FCC Part 95 rules, and amateur radio operators provided by Saratoga RACES using VHF radios under FCC Part 97 rules. No license is required to operate the FRS radios. An Amateur Radio License, Technician Class or higher, is required to operate the VHF radios.

GMRS, MURS and CB are not utilized in this plan.

The City of Saratoga has multiple handheld and mobile units licensed on a Public Safety frequency pair. None of those units are utilized in this plan.

This plan does not rely on telephone communications (cellular or wireline) or on the survival of the Saratoga Traveler Information Service radio station that transmits on 1610 kHz.

3.0 ORIENTATION AND TRAINING

3.1 CERT. Every Division will receive FRS radio familiarization/orientation training by a member of the CERT Communications Committee. Training content will be determined by the CERT Communications Committee and will include topics such as the setup and operation of the radio, how to change frequencies, and communications protocol. The intent is to provide a common operational baseline for all users.

3.2 RACES. The Saratoga Amateur Radio Association is responsible for creating and maintaining a core group of trained amateur radio operators capable of providing EOC and CERT communications support. Training content will be determined by the SARA RACES organization.

4.0 NOTIFICATION AND ACTIVATION

Official notification and activation of Saratoga CERT will be in accordance with the “Saratoga Community Emergency Response Team (CERT) Operational Plan” (TBR) for the City of Saratoga. Official activation is required in order for individual communicators to be covered by workers’ compensation insurance while performing their assigned duties as Disaster Service Workers.

SARA ARES/RACES members will likely convene on the K6SA amateur radio repeater frequency (146.655 MHz) within minutes after the onset of an event, well before any official activation takes place. City-wide damage assessment polling will take place on the K6SA amateur radio repeater. County-wide damage assessment polling will likely take place on the AA6BT (146.115 MHz) amateur radio repeater, again well in advance of any official activation. See section 8.2 for additional information.

5.0 COMMUNICATIONS EQUIPMENT

5.1 FRS radios (issued). Saratoga CERT will issue at least one pair of City-owned FRS radios to each Division. Additional FRS radios will be issued to individuals on an as-available basis. The recipient is responsible for maintaining the FRS radio.

5.2 FRS radios (individually owned). CERT members are encouraged to use their personal FRS radios since they are already comfortable with their “feel” and operation. The radios must, however, be configured in accordance with Section 8.1, which may be different than they way they are configured for family use.

Desirable characteristics for individually owned FRS radios include:

- Ease of use
 - Can switch channels easily
 - Can disable privacy codes
 - Can lock keyboard
- Replaceable AA batteries
 - Compact but longer life than AAA
 - Readily available battery type
 - Avoids half-charged or no-power scenarios of rechargeable batteries.
- Remote speaker/microphone (with clip) capable
 - CERT members may be busy with their hands
 - Easier to operate while wearing gloves
- FRS-capable only
 - Avoids GMRS license issues
 - Unfortunately, most radios sold today are combination FRS/GMRS

5.3 Amateur radios. Amateur radio operators are responsible for providing and maintaining their own communications equipment. Amateurs operating with CERT teams in the field should have a handheld programmable VHF two-way radio, with a spare battery pack, and capable of operating on the 2-meter amateur band. There is no plan for the City to supply any of these radios.

5.4 EOC radios. The SARA is the custodian of the amateur radio equipment installed at the EOC. The SARA will provide operational support to the City-owned radio at the EOC during emergencies and will perform the monthly EOC-to-EOC radio checks sponsored by County Communications. Technical support for the City-owned radio is provided by County Communications. This equipment consists of a Motorola CDM1250 (or equivalent) radio and a colocated power supply.

6.0 EXPENDABLES AND MAINTENANCE

6.1 FRS Radio. Saratoga CERT will supply alkaline (non rechargeable) batteries to each Division for use in the FRS radios. Batteries stored at the Division level will be rotated every year. Reliance on rechargeable batteries in personal FRS radios is discouraged since once they are discharged there may not be any power available to recharge them. Recharging also typically takes several hours.

6.2 Amateur Radio. Amateur radio operators will provide their own batteries and power packs in accordance with normal RACES emergency preparedness recommendations.

7.0 SARATOGA CERT AMATEUR RADIO DEPLOYMENT

Amateur radio operators supporting CERT will be assigned to the following locations in the order shown, subject to availability of personnel. These assignments can be changed at the discretion of the City Operations and/or Logistics Section Chief or his/her designee.

- Emergency Operations Center
 - Three persons (Two licensed amateurs and one support/EOC communicator)
- Divisions (Neighborhoods)
 - One per division. May be the same person as the CERT Communicator.
- Supply Bases
 - One person
- Emergency Volunteer Center
 - One person if EVC is remote from the EOC
- Rovers
 - Spontaneous Volunteers as assigned by the Emergency Volunteer Center
- Point of Distribution, Shelter, etc.
 - One person (TBR)
- Local Assistance Center
 - One person
- Bulk Distribution Site
 - One person (TBR)
- Local Schools
 - One per school (TBR)
- Saratoga Retirement Community
 - None
- West Valley College
 - None

8.0 RADIO COMMUNICATIONS EQUIPMENT INITIALIZATION

The FRS radio configuration in Section 8.1 is recommended in order to provide a common baseline for all communicators. Modifications to this configuration can be performed in real-time by mutual agreement once initial/baseline communication is established.

It is recommended that the FRS radios (either personal or City-issued) be stored already configured in accordance with Section 8.1. Retaining the settings requires that the batteries remain installed in the radios, otherwise the settings might be lost.

Battery life with the radio “off” (but still consuming power to retain memory settings) will likely exceed one year. Batteries should be checked and/or replaced at six-month intervals. Turning the radio on and verifying that it has retained its settings is a sufficient check. An unused spare set of batteries should be on hand to replace the partially-discharged batteries should a need for emergency FRS radio communication arise.

8.1 FRS Radios. Configure the FRS radios as shown below. Not all radios will have all of the options listed.

- Set the frequency to channel 11 (467.6375 MHz).

- Privacy Code (CTCSS or DCS) or Interference Eliminator Code turned off.
- Call Tone or Call Alert turned off.
- Voice Activated Transmit (VOX or iVOX) turned off.
- QT Noise Filtering turned off.
- Vibrate turned on if in a noisy environment.
- Keypad Tone turned on.
- “Roger” Beep (end of transmission) Tone turned off.
- Keypad locked once settings are entered.

8.2 Amateur Radios. Amateur radio frequency assignments are determined by the SARA ARES/RACES organization in conjunction with the Santa Clara County ARES/RACES organization. Typically, communications will be conducted via the K6SA repeater on a frequency of 146.655 MHz, negative offset, 114.8 Hz PL tone.

Yaesu equipment users should disable WIRES.

In the event of a repeater failure, communication will continue on 146.655 MHz simplex/114.8 Hz PL. The alternate simplex frequency will be 146.505 MHz, no PL tone. The second alternate simplex frequency will be 146.595 MHz, no PL tone.

8.3 EOC Radio. Turn on the Astec power supply and the Motorola CDM1250 (or equivalent) radio. Assure channel 1 (duplex) is selected. Channel 2 is simplex. Instructions are posted near the radio.

9.0 COMMUNICATION PROCEDURES

All communicators should follow generally accepted communication procedures, some of which are listed below:

- Use predetermined tactical call signs. Amateur radio operators must also use their FCC assigned call sign.
- Listen on the frequency before transmitting in order to avoid interfering with a communication already taking place. Only one person can use the frequency at any given time.
- Use the basic procedural words “THIS IS,” “OVER,” “GO AHEAD” and “OUT.”
- Direct all communications to a specific person or unit.
 - Say the tactical call of the unit you are calling, then say “THIS IS” then say your tactical call, then say “OVER.” At the end of your final transmission, say “OUT” meaning that you are done and expect no further reply. Using “OVER and OUT” together is unnecessary.
- Respond only to known persons.
 - Say “THIS IS” then say your tactical call, then say “GO AHEAD.”
- Speak in plain language and use common terminology.
 - Do not use any “10 codes” or TV cop lingo.
- Speak in a normal tone of voice. Shouting only distorts your voice, it does nothing to increase the range.
- If someone seems to be in charge (a net control station, for example) listen to them and do what they say.
- When transmitting a formal (i.e., written) message, say five words at a time and ask for an acknowledgement after each five-word group.

- Do not speak immediately upon pressing the push-to-talk switch, because the first syllable will probably get “clipped.” Hesitate for a fraction of a second before speaking.
- Test your radio before separating from your group or partner.
- Use universally accepted phonetics. See Appendix 6.

10.0 PRACTICE DRILLS

Communications practice drills will normally be part of a larger CERT exercise or county-wide quarterly drill. The objective of the drills are to practice and demonstrate communications capability from the Saratoga EOC to the Divisions and back (and vice versa), communications within the Divisions, and communications between the Divisions. Drills also provide the opportunity to practice response to communications anomalies.

Amateur radio support to these practice drills will be performed under ACS authority, rather than RACES, to avoid conflict with FCC limitations imposed on the use of amateur radio repeaters for RACES training.

SARA conducts weekly nets for the purpose of ensuring personnel and equipment readiness. Net control responsibility rotates among the participants on a volunteer basis.

11.0 INTERFERENCE MITIGATION

All radio communication is susceptible to interference from various sources, natural or man made. Interference may be accidental or intentional. Saratoga CERT can be the recipient or the interferor. The most likely “surprise” interference will occur on the FRS frequencies, probably due to children playing with the radios, or adults trying to contact other family members. No individual has an exclusive right to any radio frequency or channel.

The Saratoga CERT FRS initialization frequency is intentionally chosen to be channel 11 (467.6375 MHz) centered in the FRS-only region of channel 8 to channel 14 so that there are three frequencies (channels) above and below the initialization frequency. It may be possible to avoid an interferor by stepping up (or down) one or two or three channels. The EOC should be informed of the intent to change frequencies, via amateur radio, and informed again with the final frequency information in order to maintain frequency coordination.

It might be possible to reduce or eliminate interference by simply moving to a slightly different location. Sometimes, moving only a few inches will make a difference.

Another method is to simply wait for the interferor to “go away.” Listening to the conversation may give a clue as to how long the contact will last.

Contacting the interferor to ask to use the frequency for a moment might work, but most likely they are using CTCSS or DCS “quiet codes” and therefore can’t hear your audio.

Using CTCSS or DCS does not eliminate interference between units on the same frequency. It simply masks it and creates the illusion of non-interference. It is recommended that these functions be turned off so that any activity on the frequency is apparent.

FRS and GMRS channels are shared (Appendix 2). FRS radios are at a disadvantage except for channels 8 through 14 because GMRS is allowed to use higher power, however, any channel between 1 and 22 may be used by FRS and GMRS simultaneously.

12.0 SPONTANEOUS VOLUNTEERS

Radio-communications-capable volunteers will likely surface in event of an emergency. Some will appear in person and others will show up on the FRS or amateur radio frequencies, particularly on the K6SA repeater.

Those that appear in person should be referred to the Emergency Volunteer Center so that they can be registered as Disaster Service Workers and deployed to local areas needing their expertise.

Those that show up on one of the radio frequencies should be utilized as casual informants only, and *not* assigned to any task until they have been registered as a Disaster Service Worker. This is important because the State of California Disaster Service Worker Volunteer Program provides workers' compensation insurance coverage in the event a Disaster Service Worker volunteer is injured while performing *assigned* disaster duties.

APPENDIX 1

Abbreviations and Definitions

Abbreviations

ACS	Auxiliary Communications Services
CB	Citizen Band (Citizens Radio Service)
CERT	Community Emergency Response Team
CTCSS	Continuous Tone-Coded Squelch
DCS	Digital-Coded Squelch
EOC	Emergency Operations Center
FCC	Federal Communications Commission
FRS	Family Radio Service
GMRS	General Mobile Radio Service
kHz	Kilohertz (1,000 Hertz)
MHz	Megahertz (1,000,000 Hertz)
MURS	Multi-Use Radio Service
OES	Office of Emergency Services
PL	Private Line
RACES	Radio Amateur Civil Emergency Service
SARA	Saratoga Amateur Radio Association
TBD	To be determined
TBR	To be revised
UHF	Ultra High Frequency (300-3000 MHz)
VHF	Very High Frequency (30-300 MHz)
VOX	Voice Operated switch
WIRES	Wide-coverage Internet Repeater Enhancement System. Found only on radios manufactured by Yaesu/Vertex.

Definitions

Tactical Call Sign: An arbitrary call sign used to identify an individual or group for operational convenience. This is not the same as the call signs issued by the FCC to amateur radio operators.

APPENDIX 2

FRS/GMRS Frequencies

Chan.	Freq.	FRS Pwr	GMRS Pwr	T7400*	T9500*	KF-100*		
1	462.5625	2 W	5 W	1	1	1		
2	462.5875	2 W	5 W	2	2	2		
3	462.6125	2 W	5 W	3	3	3		
4	462.6375	2 W	5 W	4	4	4		
5	462.6625	2 W	5 W	5	5	5		
6	462.6875	2 W	5 W	6	6	6		
7	462.7125	2 W	5 W	7	7	7		
8	467.5625	0.5 W	0.5 W	8	8	8		
9	467.5875	0.5 W	0.5 W	9	9	9		
10	467.6125	0.5 W	0.5 W	10	10	10		
11	467.6375	0.5 W	0.5 W	11	11	11		
12	467.6625	0.5 W	0.5 W	12	12	12		
13	467.6875	0.5 W	0.5 W	13	13	13		
14	467.7125	0.5 W	0.5 W	14	14	14		
15	462.5500	2 W	50 W	15	15			
16	462.5750	2 W	50 W	16	16			
17	462.6000	2 W	50 W	17	17			
18	462.6250	2 W	50 W	18	18			
19	462.6500	2 W	50 W	19	19			
20	462.6750	2 W	50 W	20	20			
21	462.7000	2 W	50 W	21	21			
22	462.7250	2 W	50 W	22	22			

* Channels by manufacturers radio model.

Frequencies are in MHz. FRS = Family Radio Service. GMRS = General Mobile Radio Service.
 A license is not required for GMRS/FRS shared frequencies provided that transmitter power complies with FRS limits.

T7400 and T9500 are Motorola model numbers.
 KF-100 is a Fanon Courier model number.

APPENDIX 3

Typical FRS Radio Setup

Function/Menu Selection	Description	Action (for CERT)
Channel Select	Sets the operating frequency. All radios must be on the same frequency. Channel number and frequency are not standardized and might not be the same between different units.	Select one of the seven FRS-only frequencies. Do not use a GMRS-only frequency. Use a GMRS/FRS shared frequency as a last resort.
Privacy Code (CTCSS) or Privacy Code (DCS) or Interference Eliminator Code	Blocks reception of any transmission not using the same code. Most radios have CTCSS codes 1-38. Motorola adds 99 or 121 digital codes . Midland adds 83 DCS digital codes.	Must be turned off to receive signals from radios not set to this same code. Compatibility issue.
Call Tone or Call Alert	Transmits an audible alert tone to other radios set to the same channel and code.	Not functional if the Interference Eliminator Code/CTCSS is turned off.
Vibrate Alert	Radio vibrates when receiving a message from another radio set to the same channel and code.	Not functional if the Interference Eliminator Code/CTCSS is turned off.
QT Noise Filtering (Motorola)	Uses Call Tones in conjunction with Interference Eliminator Codes for enhanced interference masking.	Not applicable if the Interference Eliminator Code and the Call Tone are turned off.
“Roger” Beep (end of transmission) Tone	Transmits a beep at the end of each transmission when the PTT button is released. Alerts other users that you are through talking.	Recommend turning this on.
Voice Activated Transmit (VOX or iVOX)	Radio detects your voice and transmits when you speak. Allows hands-free operation.	Recommend turning off except in special (mobility) cases. Can create undesired transmissions on the frequency due to background noise.
VOX Sensitivity Level	Sets the sensitivity level when using VOX.	Not applicable if VOX is not used.
Keypad/Keystroke Tone or	Radio sounds a beep each time a button is pressed or a setting is changed.	Don't care. Recommend turning this on to provide user feedback or warning of inadvertant change.
Silent Operation	Disables all “beeps” and “tones”.	Leave “beeps” and “tones” enabled.
Keypad Lock	Prevents accidental changes to configuration settings.	Always keep the keypad locked when not in use.

APPENDIX 4

Motorola T9500 FRS Radio Setup

Turn the radio on

Current channel number appears in display

Press and hold MENU until padlock disappears from display to **UNLOCK KEYPAD**

1. Press MENU

Current channel number flashes

Press + or – to change **CHANNEL** to 11

2. Press MENU

Small number at bottom of display flashes

Press + or – to turn **INTERFERENCE ELIMINATOR CODE OFF(0)**

3. Press MENU

Musical note appears in display

Press + or – to turn **CALL TONE OFF**

4. Press MENU

ivox appears in display

Press + or – to turn **VOX OFF**

5. Press MENU

vox appears in display

Press + or – to to change **VOX SENSITIVITY** to 2

6. Press MENU

QT appears in display

Press + or – to turn **QT NOISE FILTERING OFF**

7. Press MENU

Vibrating radio appears in display

Press + or – to turn **VIBRACALL ALERT OFF**

8. Press MENU

Musical note appears in display

Press + or – to turn **KEYPAD TONE ON**

9. Press MENU

Sound wave appears in display

Press + or – to turn **TALK CONFIRMATION TONE OFF**

Press and hold MENU until padlock appears in display to **LOCK KEYPAD**

Note: Steps 3, 5, 7, 8 & 9 are included for continuity. Their actual value is optional.

APPENDIX 5

Motorola T7400 FRS Radio Setup

Turn the radio on

Current channel number appears in display

Press and hold MENU until padlock disappears from display to **UNLOCK KEYPAD**

1. Press MENU

Current channel number flashes

Press + or – to change **CHANNEL** to 11

2. Press MENU

Small number at right side of display flashes

Press + or – to turn **INTERFERENCE ELIMINATOR CODE** OFF(0)

3. Press MENU

CA appears in display

Press + or – to turn **CALL TONE** OFF (0)

4. Press MENU

Vibrating radio appears in display

Press + or – to turn **VIBRACALL ALERT** OFF

5. Press MENU

E appears in display

Press + or – to to change **VOX SENSITIVITY** to 2

6. Press MENU

QT appears in display

Press + or – to turn **QT NOISE FILTERING** OFF

Press and hold MENU until padlock appears in display to **LOCK KEYPAD**

Note: Steps 4 & 5 are included for continuity. Their actual value is optional.

APPENDIX 6

User Manuals for Other City-Issued FRS Radios

XF-638 WALKIE TALKIE User Manual

<https://fccid.io/2AN6WXF-638/User-Manual/User-manual-3722387>

M-880 Two Way Radio User Manual M-880

<https://fccid.io/2ACVFM-880/User-Manual/User-manual-3401315>

APPENDIX 7

Phonetic Alphabet

The NATO phonetic alphabet assigns code words to the letters of the English alphabet so that critical combinations of letters can be pronounced and understood by those who transmit and receive voice messages by radio or telephone regardless of their native language.

A	Alpha		N	November
B	Bravo		O	Oscar
C	Charlie		P	Papa
D	Delta		Q	Quebec
E	Echo		R	Romeo
F	Foxtrot		S	Sierra
G	Golf		T	Tango
H	Hotel		U	Uniform
I	India		V	Victor
J	Juliet		W	Whiskey
K	Kilo		X	Xray
L	Lima		Y	Yankee
M	Mike		Z	Zulu

Although these words are preferred, the CERT communicator is free to use any that convey the message and that come to mind. For example, A might be Adam, Apple, Airplane, etc.

Appendix 8

Miscellaneous notes

Saratoga CERT Divisions

Division Name	Division Leader(s)	Tactical Call
Cox	Reshu Jain	Cox
Quito/West Valley	Raji Lukkoor/Jessica Fullmer	Quito
Argonaut	Davina Morgan-Witts/Jeff Pangborn	Argonaut
Vineyard	James Foley	Vineyard

Local FRS channel utilization

Saratoga CERT

Team	Primary Chan.	Alternate Chan.	Call Tone
All	11	10, 12	

Redwood Middle School

Team	Primary Chan.	Alternate Chan.	Call Tone
Public Safety	14	8	7
Student Supervisor	18	8	9
Site Coordinator	16	8	6

Saint Andrew's Episcopal Church

Team	Primary Chan.	Alternate Chan.	Call Tone
All	9		

West Valley College

Team	Primary Chan.	Alternate Chan.	Call Tone
All	1	4	14