

**Election Systems & Software (ES&S)
Use of the Optech III-P Eagle and Optech IV-C, Model
400 Voting System in a Precinct Based Ranked Choice
Voting Environment for the
City and County of San Francisco**

**Prepared by:
Secretary of State Elections Division
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I. SUMMARY OF THE APPLICATION

Procedures, hardware, firmware and software developed by Election Systems & Software (ES&S) for use with the Optech III-P (precinct scanner), Optech IV-C Model 400 (central count scanner) and UNITY software suite to capture, read, interpret, record, enter, tally, tabulate, and summarize “ranked-choice” votes (RCV) for use in the City and County of San Francisco. These were developed in accordance with a Charter Amendment passed by the voters of San Francisco in March 2002.

II. SUMMARY OF THE SYSTEM

The modifications were made to a legacy system consisting of Business Records Corporation (BRC) Optech IV-C, Model 400, Central Count Ballot Scanner and Optech III-P Eagle (supported by the Election Management System (EMS)/Automated Election Returns Option (AERO)). When ES&S was formed from a merger of BRC’s election division and American Information Systems (AIS), ES&S retained the right to support the systems that were installed with then current BRC customers in California but full technology rights to the Optech design were given to Sequoia Voting Systems under a United States Department of Justice decision. At the current time, the only listed federal qualification for the Optech equipment belongs to Sequoia Voting Systems’ models, which are different than the ES&S models. ES&S has claimed federal qualification under BRC’s old qualification for the Optech Eagle dated May 1996 although the original EMS/AERO has been replaced with the ES&S’s Unity software package.¹

The modification uses normal Optech ballots with two additional contests added to each race which qualifies as a RCV race to indicate the 2nd and 3rd rank choices. The ballot scanners are to count and report the first choice as a normal race but to store and forward the rank choice votes for all three ranked choices for each RCV race. For the precinct counter, the RCV modified models are to return ballots with over votes or under votes in the 2nd and 3rd choice contest for correction to voters to change or accept. The actual calculation of the final outcome is run as separate calculation after standard reporting indicates that an RCV race has no candidate with 50 percent + 1 vote.

A hardware modification was required for the Optech Eagle to store the ballot images as a separate copy from the standard vote counts. The Optech IV-C, Model 400 required no hardware modification and stores the ballot images as a separate DOS file.

Optech III-P Eagle

The Optech III-P Eagle is utilized as the precinct level component. On election night the Eagle, immediately after the polls close, would produce precinct results for the 1st choice

¹ The Secretary of State’s office is in the process of finalizing an audit of all current county voting systems, including the legacy ES&S system used in San Francisco and several other California counties, to determine whether those systems are properly qualified under federal standards and certified under state law, and if not, what actions are appropriate.

candidates for RCV contests as well as for all non-RCV contests. The Eagle would also capture the ballot record for potential use in the RCV algorithm.

The Optech III-P Eagle voting system consists of:

- Electronic ballot reading devices, referred to as Eagles, into which a voter or authorized elections official inserts a ballot marked with the voter's choices for ballot contests.
- A marking device.
- Computer equipment and programs capable of reading, interpreting, and summarizing the information, which has been read by the Eagle device(s).

The system has been modified to add a PCMCIA Card, independent of the Memory Pack, to the current motherboard configuration.

Optech IV-C

The Optech IV-C is utilized as the absentee and provisional ballot-processing component. The IV-C captures the ballot images in a similar manner as does the Eagle, but in a different format. To allow for the RCV capture, the unit's software has been modified.

UNITY Software

The UNITY software suite has also been modified as part of the proposed system. Both the Election Data Manager (EDM) and Hardware Programming Manager (HPM) have been modified to allow for the identification of RCV contests. The Election Reporting Manager (ERM) has been modified to allow for the reading and merging of RCV data, including manually entered data from write-in ballots. It has been further modified to allow for the application of the RCV algorithm to that data. The RCV algorithm is a new component designed to read and process RCV in accordance with the rules established by the Charter amendment.

The RCV tabulation process will only be implemented in those contests covered by RCV for which there is no majority (50%+1) winner.

PRINTED BALLOT

The Department will continue to use the basic format of the OPTECH III-P Eagle ballot, but propose to modify it to allow three choices for each RCV contest. The OPTECH mark-sense ballot may vary from one column (3.75") to three columns (9.75") in width, and from 12" to 22" in length. Each column of the ballot consists of one or more contests, each with one or more candidate selection positions, and, if applicable, RCV choices. The ballot may be printed on one or on both sides.

At the right-hand edge of each selection position are printed the head and tail of an arrow. The voter uses a marking device to connect the head and tail of the arrow, thereby selecting a choice.

EXAMPLE OF BALLOT LAYOUT

BOARD OF LEISURE CONSEJO DE OCIO 休閒委員會 FIRST CHOICE SELECCION PRIMERO 第一選擇 Vote for One/ Vote por Uno/ 請選一名	EVERETT DIRKSEN ATTORNEY ABOGADO 伊夫勒·迪森 律師	VOTE BOTH SIDES OF EACH BALLOT VOTE AMBOS LADOS DE CADA BALOTA 請在每張選票前後兩面投票
NELSON W. ALDRICH INGENIERO 紐森·艾里查 工程師	JOHN HANCOCK PHYSICIAN MEDICO 約翰·亨科 醫生	
CHARLES CURTIS U.S. SENATOR SENADOR DE LOS ESTADOS UNIDOS 查里斯·庫提士 美國參議員	FLORENCE NIGHTINGALE MAESTRA 弗洛倫斯·奈迪加里 教師	
EVERETT DIRKSEN ABOGADO 伊夫勒·迪森 律師	WRITE-IN/ NO LISTADO/ 寫入	
JOHN HANCOCK PHYSICIAN MEDICO 約翰·亨科 醫生	THIRD CHOICE SELECCION TERCERA 第三選擇 Vote for One / Must Be Different Than First and Second Choice Vote por Uno / Deberá Ser Diferente de Su Primera y Segunda Selección 請選一名/ 不能與第一和第二選擇相同	
FLORENCE NIGHTINGALE TEACHER MAESTRA 弗洛倫斯·奈迪加里 教師	NELSON W. ALDRICH INGENIERO 紐森·艾里查 工程師	
WRITE-IN/ NO LISTADO/ 寫入	CHARLES CURTIS U.S. SENATOR SENADOR DE LOS ESTADOS UNIDOS 查里斯·庫提士 美國參議員	
SECOND CHOICE SELECCION SEGUNDO 第二選擇 Vote for One / Must Be Different Than First Choice Vote por Uno / Deberá Ser Diferente de Su Primera Selección 請選一名/不能與第一選擇相同	EVERETT DIRKSEN ABOGADO 伊夫勒·迪森 律師	
NELSON W. ALDRICH INGENIERO 紐森·艾里查 工程師	JOHN HANCOCK PHYSICIAN MEDICO 約翰·亨科 醫生	
CHARLES CURTIS U.S. SENATOR SENADOR DE LOS ESTADOS UNIDOS 查里斯·庫提士 美國參議員	FLORENCE NIGHTINGALE TEACHER MAESTRA 弗洛倫斯·奈迪加里 教師	
CANDIDATES CONTINUED IN NEXT COLUMN VER OTROS CANDIDATOS EN LA SIGUIENTE COLUMNA 包括下一欄的候選人	WRITE-IN/ NO LISTADO/ 寫入	

The ballot for Ranked Choice Voting, as designed at the direction of the Department's current voting system vendor, is potentially problematic. The Department was instructed by their current vendor to lay out the ballot in the above format to accommodate RCV contests. The proposed ballot layout lists each candidate for each office a total of three times and voters are instructed to vote for his/her first, second and third choices.

POLL WORKER AND VOTER FRIENDLINESS

Although the proposed RCV system may be reviewed with poll workers during their training sessions, it is the opinion of staff that the RCV system as proposed is not voter friendly. Voters will be voting on two different "types" of ballots. One ballot "type" will contain non-RCV contest and the other ballot "type" will contain RCV contests. The RCV ballot will list each candidate three separate times, opposed to once, which may lead to voter confusion. A significant voter education component is necessary with such a change, especially with minority language speakers so that the ballot layout design is fully understood.

PROCEDURES

The vendor has provided procedures for using the voting system that conform to the basic template and format required by the Secretary of State's office. As explained in the recommendations section of this report, the vendor should be required to develop additional procedures for San Francisco to follow when conducting RCV elections using this ES&S system.

III. TESTING INFORMATION AND RESULTS

1. Federal Testing

The Optech Eagle received a NASED qualification under BRC in 1996 for firmware releases MPR206, HPS128, CPS100, and APS150. The baseline firmware release for the RCV changes is MPR (not specified), HPS 128, CPS 1.02/1.04c, and APS 150.

The Optech Eagle and IV-C that are used in San Francisco were originally certified under California state rules under ownership of BRC using BRC's EMS/AERO election management and reporting software. Since then, the Optech Eagle has been re-listed under ES&S with "version 2.0" software in California but has not qualified the Optech IV-C, the Eagle, or the version 2.0 software changes nationally.

ES&S submitted source code for the modified components of the Unity software but not for the firmware changes to the Optech equipment. The change to the hardware circuit board on the Optech Eagle was submitted to Wyle Laboratories and basic environmental testing was performed, but no software review nor functional testing were performed on the specific hardware/firmware changes.

The Unity version 2.4.2, which is the baseline for the RCV modifications, was recommended for final approval to the Election Assistance Commission for NASED qualification on March 30, 2004 and has, itself, not been certified for use in California. This version included necessary support for RCV processing but required additional modifications to perform RCV processing. The testing performed for this report does not extend to qualifying the use of Unity 2.4.2 in California, but is limited to qualifying for the San Francisco IRV election in November only. The modifications to Unity 2.4.2 were submitted to Ciber, Inc. for review and testing under the VSS standards. The functional system testing was done in conjunction with state certification testing performed for this report. Software Source Code review and other ITA review tasks were done based on the VSS 1990 standards and a report was prepared. The testing and report will not result in a NASED qualification.

2. State Testing by the Secretary of State and Consultant.

The system was tested in Rockford, Illinois on March 10-12, 2004 by Secretary of State staff in conjunction with the state's technical expert, Mr. Steve Freeman.

The modification consists of:

1. Software changes to the controlling software on the Optech IV-C;
2. The addition of an Intelligent Device Adapter supporting the use of a PCMCIA card on the Optech Eagle;
3. Firmware updates to two firmware chips on the Eagle itself;
4. Firmware updates in the Memory Packs used by the Eagle;
5. Firmware updates to the proprietary reader/writer used to prepare and read Memory Packs and PCMCIA memory cards on the PC;
6. Patches to the Unity software, and
7. A third-party commercial PCMCIA card reader (OmniDrive Pro) added to the PC running Unity.

The specific versions are:

ES&S Unity Version 2.4.2 RCV modified version consists of the following units:

- Election Data Manager (EDM) Version 7.2.1.3 (RCV modification)
- Audit Manager (AM) Version 7.0.2
- Optech Image Manager Version 3.2.0.0
- Hardware Programming Manager (HPM) Version 5.0.3.2 (RCV modification)
- Data Acquisition Manager (DAM) Version 5.0.3.0
- Election Reporting Manager (ERM) Version 6.4.3.2 (RCV modification)
- RMCOBOL (COTS) Version 7.50.01
- COBOL-WOW (COTS) Version 3.12.00

ES&S Optech Ballot Scanners:

- IV-C, Model 400, Central Ballot Counter, Firmware version 1.08c (RCV modification)
- Eagle III-P Precinct Ballot Counter
 - IDA Board with PIC Micro Controller, Firmware Version RCV 74r1 (the board itself is a RCV modification as well as the firmware chip)
 - HPS EEPROM, Firmware Version 1.30, (RCV modification)
 - BIT EEPROM, Firmware Version 1.10 (RCV modification)

Other Hardware:

- ES&S Memory Packs, APS EEPROM, Firmware Version 1.52RCV (RCV modification)
- Peripherals to a PC supporting Unity 2.4.2 RCV
 - Memory Pack Reader (MPR)/IDA with PIC Micro Controller IDA 1.02.01
 - OmniDrive Pro (to upload PCMCIA card ballot images to ERM)

The changes to the existing system correctly performed the required operations under the RCV algorithm defined by the San Francisco charter provisions for Ranked Choice Voting during the test. However, problems were noted with respect to the following:

- A. The lack of audit trail records associated with the RCV algorithm;
- B. Outcomes for all the RCV races may be delayed to resolve a tie on a single race;
- C. The 1% manual recount only validates that the voters' choices were included in the data used to get the results but not that the voters' choices were counted correctly; and
- D. The firmware changes for the hardware components were not presented for the national ITA software or hardware functional testing review.

The test conducted in Rockford, Illinois was a joint effort between California certification test representatives and Ciber, Inc, a NASED certified Independent Test Authority (ITA).

The testing included:

1. A witnessed build of the executable code from Unity source code patches submitted to the ITA. The witnessed build also included the firmware for the Optech IV-C and Optech Eagle.
2. The tracked installation of the witnessed build executables for the Unity, Optech IV-C, and firmware chip changes.
3. Verification of a Logic & Accuracy (L&A) test deck that was used as core for other testing.
4. A test run of a General and Primary election using the L&A test deck and basic validation of the RCV algorithm results for the test deck.
5. A special test deck run to verify proper operation of the RCV algorithm involving a full set of variations in under vote, over vote, and write-in scenarios.
6. An end-to-end system test starting with the creation of another test election in Unity, generation of ballots and programming the ballot scanners for the election, testing the ballot scanner responses for under votes, over votes, and write-ins, and using the test deck to test system behavior during variations in tie vote conditions.
7. A limited volume test to make an estimate of loading for San Francisco in processing time and memory.
8. A review of basic security design features.

Observed Problems

1. Audit Trail

- a. The record capture of the RCV ballot is not a true image but is a record after part of the RCV algorithm is applied. The resulting record loses some information from the actual voted ballot.
- b. The RCV algorithm provides a display at each stage of the RCV choice for each race. If a tie occurs, the operator has to specify the choice between the tied candidates. The final result is available as a printed report, which summarizes the results of each pass of the RCV Algorithm. However, the audit log only shows the algorithm was used and none of the intermediate results are retained for an audit record. Of special concern, no log record is made of the operator intervention in deciding tie votes.

2. **Tie Vote Blocks.** All RCV races are processed together one phase at a time. If a tie occurs that cannot be resolved within the algorithm, the process is halted until the tie is resolved. As a result, one of two conditions may result:
 - a. None of the RCV races can be resolved until the tie is resolved for the one race.
 - b. An arbitrary choice is made for the tie vote to allow the other races to complete and be reported out. However, the report for the RCV will show an un-validated result for the tied race that has yet to be resolved. When the tie is finally resolved, the entire RCV algorithm will have to be re-run, voiding the prior report, and a new result will be generated for all the races.
3. **Source Code Review.** No source code review has been performed on the Optech IV-C or Eagle firmware.
4. **Write-ins.** If an RCV ballot has a write-in, the ballot is not counted at all but diverted to a ballot bin for separate processing. Processing at this point results in multiple paths, depending on the number of write-ins recognized for the given race and how the change is processed. A major component is changing the election definition in the Election Reporting to recognize the write-in candidates. If more than one write-in candidate is qualified, then the entire ballot has to be manually keyed in and counted within the Election Reporting Manager program to include the counts from any non-RCV races or issues on the same ballot. This practice appears to be consistent with current practices and is reported to not involve a high number of entries.

IV. FEATURES TO REDUCE “ERROR RATE”

On the front end, it is the opinion of staff that due to the ballot layout the error rate on the voter’s part will be greater than the error rate that the city and county currently experiences.

However, on the back end, the error rate should be no higher than the current system.

V. COMPLIANCE WITH STATE AND FEDERAL LAWS AND REGULATIONS

The Secretary of State of California has developed and promulgated a procedure for approving, certifying, reviewing, modifying, and decertifying voting systems, vote tabulating systems, election observer panel plans, and auxiliary equipment, materials and procedures.

Four sections of this procedure, Sections 103, 104, 504, and 601, describe in detail the requirements any voting system must meet in order to be approved for use in California elections. These sections will be described in detail and the system was analyzed for compliance in this Administrative Review and Analysis of the system.

1. §103 (a) (1): The machine or device and its software shall be suitable for the purpose for which it is intended.

Staff has concerns that the proposed system does not fully meet this section for reasons set forth below.

2. §103 (a) (2): The system shall preserve the secrecy of the ballot.

The system meets this requirement.

3. §103 (a) (3): The system shall be safe from fraud or manipulation.

The ballot card is designed on special water marked ballot paper. The paper used is only provided to certified printers who are inspected by the State, and must keep reports and track all production and distribution.

The ballot card also contains programming position marks, which allows the card to be read, thus creating another barrier to possible fraud.

The system includes restricted access to ballot counting hardware, firmware, and software; and the physical protection of all non-voted precinct and absent voter ballots, as well as of all tallied and non-tallied ballots, by use of logs to chronicle their quantity, use, and access before and after the election.

4. §103 (a) (4): The system shall be auditable for the purposes of an election recount or contest procedure.

The system is not fully auditable for the purposes of an election recount or contest procedures. The audit log does not capture information relevant to the RCV algorithm.

5. §103 (a) (5): The system shall comply with all appropriate federal and California laws and regulations.

- a. One-Percent Manual Recount – While the system does provide for the definition of how recounts will be performed on the RCV ballots in order to meet this requirement, concerns have been raised, both for this system and a previous system presented to the VSP Panel as to its compliance with this requirement. However, Secretary of State legal staff has advised that the system satisfies the requirements of this section.
- b. Resolving Tie Votes – concerns have been raised, both for this system and a previous system presented to the VSP Panel as to the system’s ability to resolve tie- votes in compliance with the appropriate Elections Code requirements. However, Secretary of State legal staff has advised that the system satisfies the requirements of this section.

6. §103 (a) (6): The system shall have been certified, if applicable, by means of qualification testing by a Nationally Recognized Test Laboratory (NRTL) and shall meet or exceed the minimum requirements set forth in the *Performance and Test Standards for Punch Card, Mark Sense, and Direct Recording Electronic Voting Systems*, or in any successor voluntary standard document, developed and promulgated by the Federal Election Commission.

Federal testing was conducted on this system against the 1990 qualification standards and does not meet or exceed the minimum requirements of the FEC standards and therefore will not receive federal qualification.

7. §103 (b): In addition to the requirements of subdivision (a) of this section, voting systems, procedures, and equipment approved and certified by the Secretary of State shall promote accessible voting opportunities for persons with physical disabilities.

The proposed system is not any less accessible than the currently certified system used by the City and County of San Francisco.

8. §104 (a): Certification consists of three separate levels of testing: qualification, certification and acceptance.

Qualification testing was performed against the 1990 qualification standards.

A technical consultant to the Secretary of State performed certification testing.

Acceptance testing would occur after the system was certified for use and the county takes delivery of the new components.

9. **§104 (b): Certification tests shall include functional tests and qualitative assessment to ensure that the system operates in a manner that is acceptable under federal and state law and regulations.**

It is the opinion of the expert technical consultant that the scope of the certification test was adequate to make basic recommendations and observations about the logical accuracy, some user friendliness issues, and compliance with state law.

10. **§104 (c): Certification tests shall enhance public confidence by assuring that the system protects the secrecy of the ballot and the security of the voting process, and records and counts votes accurately.**

The system is no more or less assuring to public confidence than the current system being used.

11. **§104 (d): Certification tests shall promote public confidence that the system is easy to use or ‘voter friendly.’**

Although this system will have a somewhat familiar look and feel to San Francisco voters, since the ballot layout is a modification to the current ballot used within the City and County, the ballot layout design does pose some serious concerns as to voter friendliness. It is the opinion of staff that the proposed ballot may be confusing to voters.

12. **§104 (e): Certification testing shall demonstrate that the system creates an audit trail showing both that the voter was able to vote for the candidate or for or against a measure of his or her choice and that the system correctly and consistently interpreted the voter’s votes.**

The Eagle does not capture “ballot images” but applies logic and captures a ballot record. The ballot record is a record of valid vote options (i.e. it does not show over votes).

13. **§504: The Evaluation shall include a review of California Elections Code sections, which address the application.**

A review of the appropriate Elections Code sections was conducted.

§15360. During the official canvass of every election in which a voting system is used, the official conducting the election shall conduct a public manual tally of the ballots tabulated by those devices cast in 1 percent of the precincts chosen at random by the elections official. If 1 percent of the precincts should be less than one whole precinct, the tally shall be conducted in one precinct chosen at random by the elections official.

In addition to the 1 percent count, the elections official shall, for each race not included in the initial group of precincts, count one additional precinct. The manual tally shall apply only to the race not previously counted.

The vendor has proposed a procedure for how RCV ballots could be counted as part of a one-percent manual recount. Given the nature of the algorithm, the results of the manual recount may not reflect the results achieved from the original count. However, Secretary of State legal staff has advised that the system satisfies the requirements of this section.

§19300 permit the voter to vote for all the candidates of one party or in part for the candidates of one party and in part for the candidates of one or more other parties.

The system allows voters to choose among candidates which they are qualified to vote for; however, for RCV contests voters will only be allowed to vote for up to three choices due to the constraints of the ballot layout design.

§19301. A voting machine shall provide in the general election for grouping under the name of the office to be voted on, all the candidates for the office with the designation of the parties, if any, by which they were respectively nominated.

The designation may be by usual or reasonable abbreviation of party names.

The system meets this requirement.

§19302. The labels on voting machines and the way in which candidates' names are grouped shall conform as nearly as possible to the form of ballot provided for in elections where voting machines are not used.

The system meets this requirement.

§19303. If the voting machine is so constructed that a voter can cast a vote in part for presidential electors of one party and in part for those of one or more other parties or those not nominated by any party, it may also be provided with: (a) one device for each party for voting for all the presidential electors of that party by one operation, (b) a ballot label therefore containing only the words "presidential electors" preceded by the name of the party and followed by the names of its candidates for the offices of President and Vice President, and (c) a registering device therefore which shall register the vote cast for the electors when thus voted collectively.

If a voting machine is so constructed that a voter can cast a vote in part for delegates to a national party convention of one party and in part for those of one or more other parties or those not nominated by any party, it may be provided with one device for each party for voting by one operation for each group of candidates to national

conventions that may be voted for as a group according to the law governing presidential primaries.

No straight party voting device shall be used except for delegates to a national convention or for presidential electors.

The system complies with these requirements.

§19304. A write-in ballot shall be cast in its appropriate place on the machine, or it shall be void and not counted.

The systems allows for write-in votes.

§19320. Before preparing a voting machine for any general election, the elections official shall mail a written notice to the chairperson of the county central committee of at least two of the principal political parties, stating the time and place where machines will be prepared. At the specified time, one representative of each of the political parties shall be afforded an opportunity to see that the machines are in proper condition for use in the election.

The party representatives shall be sworn to perform faithfully their duties but shall not interfere with the officials or assume any of their duties. When a machine has been so examined by the representatives, it shall be sealed with a numbered metal seal. The representatives shall certify to the number of the machines, whether all of the counters are set at zero (000), and the number registered on the protective counter and on the seal.

The submitted procedures address these requirements for the Optech Eagle devices.

§19321. The elections official shall affix ballot labels to the machines to correspond with the sample ballot for the election. He or she shall employ competent persons to assist him or her in affixing the labels and in putting the machines in order. Each machine shall be tested to ascertain whether it is operating properly.

The submitted procedures address these requirements for the Optech Eagle devices.

§19322. When a voting machine has been properly prepared for an election, it shall be locked against voting and sealed. After that initial preparation, a member of the precinct board or some duly authorized person, other than the one preparing the machines, shall inspect each machine and submit a written report. The report shall note the following: (1) Whether all of the registering counters are set at zero

(000), (2) whether the machine is arranged in all respects in good order for the election, (3) whether the machine is locked, (4) the number on the protective counter, (5) the number on the seal. The keys shall be delivered to the election board together with a copy of the written report, made on the proper blanks, stating that the machine is in every way properly prepared for the election.

The system's procedures address this issue.

§19340. Any member of a precinct board who has not previously attended a training class in the use of the voting machines and the duties of a board member shall be required to do so, unless appointed to fill an emergency vacancy.

The system's procedures address this issue.

§19341. The precinct board shall consist of one inspector and two judges who shall be appointed and compensated pursuant to the general election laws. One additional inspector or judge shall be appointed for each additional voting machine used in the polling place.

The system's procedures address this issue.

§19360. Before unsealing the envelope containing the keys and opening the doors concealing the counters the precinct board shall determine that the number on the seal on the machine and the number registered on the protective counter correspond to the numbers on the envelope.

Each member of the precinct board shall then carefully examine the counters to see that each registers zero (000). If the machine is provided with embossing, printing, or photography devices that record the readings of the counters the board shall, instead of opening the counter compartment, cause a "before election proof sheet" to be produced and determined by it that all counters register zero (000).

If any discrepancy is found in the numbers registered on the counters or the "before election proof sheet" the precinct board shall make, sign, and post a written statement attesting to this fact. In filling out the statement of return of votes cast, the precinct board shall subtract any number shown on the counter from the number shown on the counter at the close of the polls.

The procedures meet these requirements for the Optech Eagle devices.

§19361. The keys to the voting machines shall be delivered to the precinct board no later than 12 hours before the opening of the polls. They shall be in an envelope upon which is written the designation and location of the election precinct, the number of the voting machine, the number on the seal, and the number registered on the protective counter. The precinct board member receiving the key shall sign a receipt.

The envelope shall not be opened until at least two members of the precinct board are present to determine that the envelope has not been opened.

At the close of the polls the keys shall be placed in the envelope supplied by the official and the number of the machine, the number written on the envelope.

The procedures meet these requirements for the Optech Eagle devices.

§19362. The exterior of the voting machine and every part of the polling place shall be in plain view of the election precinct board and the poll watchers.

Each machine shall be at least four feet from the poll clerk's table.

The procedures meet these requirements.

§19363. Voters shall not remain in or occupy the booths or compartments longer than is necessary to mark their ballots, which shall not exceed five minutes. However, where no other voter would be inconvenienced, a longer period shall be allowed.

The procedures meet these requirements.

§19370. As soon as the polls are closed, the precinct board, in the presence of the watchers and all others lawfully present, shall immediately lock the voting machine against voting and open the counting compartments, giving full view of all counter numbers. A board member shall in the order of the offices as their titles are arranged on the machine, read and distinctly announce the name or designating number and letter on each counter for each candidate's name and the result as shown by the counter numbers. He or she shall also in the same manner announce the vote on each measure.

If the machine is provided with a recording device, in lieu of opening the counter compartment the precinct board shall proceed to operate the mechanism to produce the statement of return of votes cast record in a minimum of three copies, remove the irregular ballot, if any, record on the statement of return of votes cast record. The irregular ballot shall, be

attached to the statement of result record of votes cast for the machine and become a part thereof. One copy of the statement of return of votes cast for each machine shall be posted upon the outside wall of the precinct for all to see. The statement of return of votes cast for each machine for the precinct shall constitute the precinct statement of result of votes cast.

The procedures meet these requirements.

§19371. Before adjourning, the precinct board shall seal the operating lever with the seal provided and lock the machine so that the voting and counting mechanism may not be operated.

It shall remain locked and sealed against operation until the time for filing a contest of election has expired, which shall not exceed a period of 30 days following the declaration of the result of the election by the body canvassing the returns.

Does not apply.

§19380. During the reading of the result of votes cast, any candidate or watcher who may desire to be present shall be admitted to the polling place. The proclamation of the result of the votes cast shall be distinctly announced by the precinct board who shall read the name of each candidate, or the designating number and letter of his or her counter, and the vote registered on the counter. The board shall also read the vote cast for and against each measure submitted. The board shall not count votes cast for write-in candidates, but shall have these counted by the elections official. During the proclamation, many opportunities shall be given to any person lawfully present to compare the result so announced with the counter dials of the machine, and any necessary corrections shall immediately be made by the precinct board, after which the doors of the voting machine shall be closed and locked.

If the machine is provided with a recording device, the alternate procedures in Section 19370 may be used.

Does not apply.

§19381. In each election district where voting machines are used, statements of the results of the vote cast shall be printed to conform with the type of voting machine used.

The designating number and letter on the counter for each candidate shall be printed next to the candidate's name on the statements of result of the vote cast. Two such statements shall be used in each election district.

The procedures meet these requirements.

§19382. The statement of the result of votes cast, which shall be certified by the precinct board, shall contain:

- (a) The total number of votes cast.**
- (b) The number of votes cast for each candidate and measure as shown on the counter.**
- (c) The number of votes for persons not nominated.**
- (d) Printed directions to the precinct board for their guidance before the polls are opened and when the polls are closed.**
- (e) A certificate, which shall be signed by the election officers before the polls are opened, showing:**
 - (1) The delivery of the keys in a sealed envelope.**
 - (2) The number on the seal.**
 - (3) The number registered on the protective counter.**
 - (4) Whether all of the counters are set at zero (000).**
 - (5) Whether the public counter is set at zero (000).**
 - (6) Whether the ballot labels are properly placed in the machine.**
- (f) A certificate that shall be filled out after the polls have been closed, showing:**
 - (1) That the machine has been locked against voting and sealed.**
 - (2) The number of voters as shown on the public counter.**
 - (3) The number on the seal.**
 - (4) The number registered on the protective counter.**
 - (5) That the voting machine is closed and locked.**

The proposed system will utilize the Optech Eagle devices, which will be used at the precincts to tabulate the 1st choice votes as well as the votes for non-RCV races. The Eagles will provide precinct level results for all 1st choice candidates and non-RCV races. The Eagle will not provide vote totals for 2nd and 3rd choice candidates.

§19383. A member of the precinct board shall enter the vote, as registered, on the statements of result of votes cast, in the same order on the space that has the same name or designating number and letter, after which another member shall verify the figures by calling them off in the same manner from the counters of the machine.

The counter compartment of the voting machine shall remain open until the official returns and all other reports have been fully completed and verified by the precinct board.

If the machine is provided with a recording device, the alternate procedures in Section 19370 may be used.

Does not apply.

§19384. The precinct board shall, before it adjourns, post conspicuously on the outside of the polling place a copy of the result of the votes cast at the

polling place. The copy of the result shall be signed by the members of the precinct board.

If the machine is provided with a recording device, the statement of result of vote's cast produced by operating its mechanism may be considered the "result of the votes cast" at the polling place.

The proposed system will utilize the Optech Eagle devices, which will be used at the precincts to tabulate the 1st choice votes as well as the votes for non-RCV races. The Eagles will provide precinct level results for all 1st choice candidates and non-RCV races. The Eagle will not provide vote totals for 2nd and 3rd choice candidates.

§19385. The precinct board shall immediately transmit unsealed to the elections official a copy of the result of the votes cast at the polling place, the copy shall be signed by the members of the precinct board, and shall be open to public inspection.

The proposed system will utilize the Optech Eagle devices, which will be used at the precincts to tabulate the 1st choice votes as well as the votes for non-RCV races. The Eagles will provide precinct level results for all 1st choice candidates and non-RCV races. The Eagle will not provide vote totals for 2nd and 3rd choice candidates.

§19386. Before proceeding to canvass the returns of an election at which voting machines have been used to register the votes cast, the board authorized to canvass returns shall open the counter compartment and compare the records of votes cast for the several candidates voted for and for and against the several measures voted upon shown on each machine with those recorded on the statement of results of votes cast prepared from that machine by the precinct board. Any errors found on the statement shall be corrected by crossing out the recorded incorrect number, and recording the correct number nearby.

The proposed system will utilize the Optech Eagle devices, which will be used at the precincts to tabulate the 1st choice votes as well as the votes for non-RCV races. The Eagles will provide precinct level results for all 1st choice candidates and non-RCV races. The Eagle will not provide vote totals for 2nd and 3rd choice candidates.

14. §504 (b): A review of federal statutes or regulations, which address the application.

The Voting Rights Act of 1965, as amended (42 U.S.C. 1973), requires all elections in certain covered jurisdictions to provide registration and voting materials and oral assistance in the language of a qualified language minority group in addition to

English. Currently in California, there are six VRA languages (Spanish, Chinese, Japanese, Vietnamese Korean and Tagalog) as prescribed under the law.

Information can be printed in additional languages as needed on the ballot.

The National Voter Registration Act of 1993 (42 U.S.C. 1973gg and 11 CFR 8) allows for the casting of provisional ballots through Fail-Safe Voting procedures.

The system allows for the issuing of fail-safe or provisional ballots through the use of specially marked envelopes. The envelopes basically indicate that the voter is a fail-safe or provisional voter. Provisional voter ballots are in substantially the same form of absent voter ballots. If, during the canvass, the voter is deemed to have eligibility to vote in an election, the vote totals can be integrated with the rest of the results.

The Voting Accessibility for the Elderly and Handicapped Act of 1984 (42 U.S.C. 1973ee through 1973ee-6) requires each political subdivision conducting elections within each state to assure that all polling places for federal elections are accessible to elderly and handicapped voters, except in the case of an emergency as determined by the state's chief election officer or unless the state's chief election officer: (1) determines, by surveying all potential polling places, that no such place in the area is accessible or can be made temporarily accessible, and (2) assures that any handicapped voter assigned to an inaccessible polling place will, upon advance request under established state procedures, either be assigned to an accessible polling place or be provided an alternative means of casting a ballot on election day.

The system is no more or less accessible than the current system being used.

The Retention of Voting Documentation (42 U.S.C. 1974 through 1974e) statute applies in all jurisdictions and to all elections in which a federal candidate is on a ballot. It requires elections officials to preserve for 22 months all records and papers which came into their possession relating to an application, registration, payment of a poll tax, or other act requisite to voting. Note: The US Department of Justice considers this law to cover all voter registration records, all poll lists and similar documents reflecting the identity of voters casting ballots at the polls, all applications for absentee ballots, all envelopes in which absentee ballots are returned for tabulation, all documents containing oaths of voters, all documents relating to challenges to voters or absentee ballots, all tally sheets and canvass reports, all records reflecting the appointment of persons entitled to act as poll officials or poll watchers, and all computer programs used to tabulate votes electronically. In addition, it is the Department of Justice's view that the phrase "other act requisite to voting" requires the retention of the ballots themselves, at least in those jurisdictions where a voter's electoral preference is manifested by marking a piece of paper or by punching holes in a computer card.

The system allows for the retention of the actual ballots.

15. **504 (c): A copy of the approved Qualification Test results released directly to the Secretary of State by a Nationally Recognized Test Laboratory (NRTL).**

Federal testing was conducted on this system against the 1990 qualification standards and the system will not receive federal qualification.

16. **§504 (d): A review, if applicable, of transcripts or other materials from prior meetings or hearings on the proposed system, procedure, or modification, either in whole or in part.**

The relevant documentation has been reviewed.

17. **§504 (e): A review, if applicable, of any procedures manuals, guidelines or other materials adopted for use with the system addressed by the application.**

The procedures for use with this system have been reviewed.

18. **§504 (f): A review of any effect the application will have on the security of the election system.**

The system is no more or less secure than the current system being used.

19. **§504 (g): A review of any effect the application will have on the accuracy of the election system.**

The system is no more or less accurate than the current system being used.

20. **§504 (h): A review of any effect the application will have on the ease and convenience with which voters use the system.**

As mentioned previously, staff has concerns as to the “voter-friendliness” of the proposed ballot layout design. It is staff’s opinion that a comprehensive voter education effort would need to be conducted prior to the use of such a proposed system.

21. **§504 (i): A review of any effect the application will have on the timeliness of vote reporting.**

The RCV algorithm does not appear to impact the timeliness of final vote reporting.

22. **§504 (j): A review of any effect the application will have on the overall efficiency of the election system.**

The system does not appear to be any less efficient than the current system.

23. **§504 (k): A Description of Deposit Materials showing that the Ballot Tally Software Source Code has been deposited in Escrow with an Escrow Company approved pursuant to Chapter 6, Division 7, Title 2 of the California Administrative Code, beginning with Section 20630.**

The source code software will be deposited upon approval and certification of the system.

24. **§601: The Secretary of State shall not approve a proposed item without a finding that the item conforms to all applicable laws, procedures and regulations, including the right to a secret ballot, does not compromise the accuracy, security or integrity of the election process, nor interferes with the voter's ease and convenience in voting.**

The system as presented does not fully conform to this requirement for reasons set forth above.

VI. ADDITIONAL CONSIDERATIONS

In response to the public meeting notice being issued and allowing for written submissions, we have received 62 correspondences encouraging approval of the proposed system. Of these, 22 appear to be "form letters," 8 are copies of correspondences previously sent to the VSPP for an earlier hearing last year on Ranked Choice Voting and 7 are copies of letters sent to various government officials in San Francisco. In addition, 1 correspondence was received encouraging rejection of the proposed system. Since most of the letters submitted by individuals are similar in content, examples of the submissions are attached. In addition, copies of all the correspondences are available separately.

VII. RECOMMENDATION

Staff recommends certification of this system with the following provisions:

- A. The RCV modification only be used on a one-time basis in San Francisco's November 2004 Election;
- B. The source code for the Optech III-P Eagle, Optech IV-C, Memorypack, and Intelligent Device Adapter firmware must be submitted for federal review by April 22nd and testing results received by June 30th. The review must include code that currently:
 - (1) May be used to gain unlawful control of the program;
 - (2) Provides executable path(s) to other code; and
 - (3) Modifies other code or moves data/code into an executable location
- C. Amend the system's procedures to require the City and County of San Francisco to create a detailed audit log to accommodate for the unacceptable audit log of the software.
- D. The RCV components may only be used with State certified equipment.