King County

Metropolitan King County Council
Committee of the Whole

STAFF REPORT

Agenda Item No.: 6		**Date:**	**30 July 2007**
Motion No.: 2007-0400		**Prepared by:**	**Nick Wagner**

SUBJECT

A motion expressing the Council's intent to add to the county's 2008 state legislative agenda a request to revise state law to allow individual counties, such as King County, to adopt customized procedures for conducting routine, random, post-election audits, as long as those procedures are at least as statistically valid in assuring the accuracy of election results as the procedures prescribed by state law for other counties.

BACKGROUND

One of the most effective and persuasive tools for confirming the accuracy of paper ballot tabulation systems is to perform routine, random, manual audits of a percentage of the paper ballots, comparing the manual results with the results generated by the paper ballot tabulation systems.[1] Such audits are one of the recommendations of the Brennan Center Task Force on Voting System Security.[2]

In order for such audits to be statistically valid and persuasive, the ballots to be audited should be chosen in a random and transparent way, and a sufficient percentage of ballots should be audited.[3] The percentage depends on the closeness of the election. The closer the election, the larger the percentage of ballots that must be audited in order to have the same probability of revealing machine malfunction and/or fraud that might have affected the election results.

For this reason, a bill pending in Congress, the Voter Confidence and Increased Accessibility Act of 2007 (H.R. 811, also known as the "Holt Bill"), would provide for a "tiered" approach to auditing ballots, with the percentage of ballots to be audited depending on the closeness of the election, as described in the following table:

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[1] *See* Congressional testimony of Professor David Wagner, University of California, Berkeley, dated 15 March 2007, at p. 6, available online at: http://www.cs.berkeley.edu/~daw/papers/testimony-house07.pdf.
[2] *See The Machinery of Democracy: Protecting Elections in an Electronic World* (2006), pp. 87-88, available online at: http://www.brennancenter.org/dynamic/subpages/download_file_39288.pdf.
[3] *Id.*, pp. 89-90.

Margin of Victory	Percent of Ballots to Be Audited
Greater than or equal to 2%	3%
Greater than or equal to 1%, but less than 2%	5%
Less than 1%	10%

This tiered audit approach has the benefit of providing increased security in close elections without placing an undue burden on election officials. This is explained more fully in the attached memorandum, which was submitted in support of the Holt bill by a group of leading experts on election auditing and election security (Attachment 4 to this staff report).

CURRENT STATE LAW

RCW 29A.60.170, as amended by Substitute House Bill 1654, effective 22 July 2007, provides in part:

> (4) In counties voting entirely by mail, a random check of the ballot counting equipment may be conducted upon mutual agreement of the political party observers or at the discretion of the county auditor. The random check procedures must be adopted by the county canvassing board prior to the processing of ballots. The random check process shall involve a comparison of a manual count to the machine count and *may involve up to either three precincts or six batches depending on the ballot counting procedures in place in the county*. The random check will be limited to one office or issue on the ballots in the precincts or batches that are selected for the check. The selection of the precincts or batches to be checked must be selected according to procedures established by the county canvassing board and the check must be completed no later than forty-eight hours after election day. [Emphasis added.]

There are 2,555 election precincts in King County, and an estimated 900,000 paper ballots are expected to be cast in the 2008 Presidential election. "Batches" of ballots consist of between 200 and 300 ballots. RCW 29A.60.170(4) would provide for auditing of at most 3 out of 2,555 precincts (0.12%) or about 1,800 (six batches of 300 ballots) out of 900,000 ballots (0.20%). Auditing of such a small percentage of ballots is unlikely to reveal machine malfunction or fraud, regardless of the margin of victory.

Currently, Washington law does not permit an individual county, such as King County, to provide for auditing of a larger number of precincts or batches of ballots than is specified in RCW 29A.60.170(4).

SUMMARY OF THE PROPOSED LEGISLATION

Proposed Motion 2007-0400 would establish the Council's intention to add to the County's 2008 state legislative agenda a request to revise state law to permit individual counties, such as King County, to adopt customized procedures for conducting routine, random, post-election audits, as

long as those procedures are at least as statistically effective in assuring the accuracy of election results as the procedures prescribed by state law for other counties.

AMENDMENTS

Amendment A1 (Attachment 2 to this report) would revise the motion as follows:

> The King County council hereby adopts establishes the council's intent to include, as part of its 2008 state legislative agenda, a revision of a request to revise Washington State law to permit individual counties the size of King County to adopt by ordinance customized procedures for conducting routine, random, postelection audits of election results, as long as those procedures are at least as statistically effective valid in assuring the accuracy of election results as the procedures prescribed by state law for other counties.

Amendment A1 would: (1) clarify that the motion establishes the Council's intent to add this issue to the County's 2008 state legislative agenda, rather than beginning the process of putting together the agenda, which will be taken up later this year in consultation with the Executive; (2) clarify that the Council does not intend that the option to adopt customize auditing procedures be limited to King County; and (3) make a non-substantive wording change in line 20 of the motion.

Title Amendment T1 (Attachment 3 to this report) would amend the title of the motion to conform to Amendment A1.

INVITED

1. Sherril Huff, Director, REALS, DES
2. Bill Huennekens, Vote-by-Mail Transition Manager, REALS, DES
3. Laird Hail, Information Systems Manager, REALS, DES
4. Garth Fell, Assistant Superintendent for Ballot Processing and Delivery, REALS, DES

ATTACHMENTS

1. Proposed Motion 2007-0400
2. 2007-0400 Amendment A1
3. 2007-0400 Title Amendment T1
4. Memo re. Holt Bill

KING COUNTY

1200 King County Courthouse
516 Third Avenue
Seattle, WA 98104

Signature Report

July 27, 2007

Motion

Proposed No. 2007-0400.1	**Sponsors** Patterson, Ferguson and Constantine

1   A MOTION establishing as part of the 2008 State

2   Legislative Agenda for King County a revision of state law

3   to permit King County to adopt customized procedures for

4   conducting routine, random, postelection audits.

5

6   WHEREAS, public confidence in the election process rests in part on voters' firm

7 conviction that the vote count is accurate and has not been tainted by either error or fraud,

8 and

9   WHEREAS, routine, random, postelection audits of election results are an

10 essential means of confirming that automated voting systems have produced an accurate

11 vote count, and

12   WHEREAS, current Washington state law provides for a form and scope of post-

13 election auditing that, as applied to counties with as many voters as King County, does

14 not permit a sufficient number of ballots to be audited and does not require random

15 selection of the ballots to be audited;

16   NOW, THEREFORE, BE IT MOVED by the Council of King County:

17   The King County council hereby adopts as part of its 2008 state legislative agenda

18 a revision of Washington State law to permit counties the size of King County to adopt

19 by ordinance customized procedures for conducting routine, random, postelection audits

20 of election results, as long as those procedures are at least as statistically effective in

21 assuring the accuracy of election results as the procedures prescribed by state law for

22 other counties.

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KING COUNTY COUNCIL
KING COUNTY, WASHINGTON

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ATTEST:

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Attachments None

July 30, 2007

A1

nw

Sponsor: Patterson

Proposed No.: 2007-0400

1 **AMENDMENT TO PROPOSED MOTION 2007-0400, VERSION 1**

2 On page 2, line 17, delete "adopts" and insert "establishes the council's intent to include,"

3 and insert "," after "agenda".

4 On page 2, line 18, delete "revision of" and insert "request to revise".

5 On page 2, line 18, insert "individual" after "permit" and delete "the size of King

6 County".

7 On page 2, line 20, delete "effective" and insert "valid".

8 **EFFECT: Amendment A1 would: (1) clarify that the motion establishes the**

9 **Council's intent to add this issue to the County's 2008 state legislative agenda, but**

10 **does not begin the process of putting together the agenda, which will be taken up**

11 **later this year in consultation with the Executive; (2) clarify that the Council does**

12 **not intend that the option to adopt customize auditing procedures be limited to King**

13 **County; and (3) make a non-substantive wording change in line 20 of the motion.**

July 30, 2007

nw

Sponsor: Patterson

Proposed No.: 2007-0400

1   **TITLE AMENDMENT TO PROPOSED MOTION 2007-0400, VERSION 1**

2   On page 1, line 1, insert, after "establishing", "the council's intent to include, ".

3   On page 1, line 3, delete "revision of" and insert "request to revise".

4   On page 1, line 3, delete "King County" and insert "individual counties".

5   **EFFECT: Title Amendment T1 would amend the title of the motion to conform to**

6   **proposed Amendment A1.**

To:	Congressman Rush Holt
From:[*]	Lawrence Norden, Brennan Center for Justice at NYU School of Law
	Aaron Burstein, Samuelson Law, Technology & Public Policy Clinic, UC Berkeley School of Law
	Joseph Hall, School of Information, UC Berkeley
	David L. Dill, Department of Computer Science, Stanford University
	Candice Hoke, Director, Center for Election Integrity, Cleveland State University
	Walter Mebane, Department of Government, Cornell University
	Freddie Oakley, Yolo County, CA, Clerk-Recorder
	Ronald L. Rivest, MIT EECS Department
	David Wagner, Department of Electrical Engineering and Computer Sciences, UC Berkeley
Date:	1 February 2007
Re:	Thoughts on Mandatory Audits

We write to support your decision to adopt a "tiered" approach to auditing of voter verified paper records in the Voter Confidence and Increased Accessibility Act of 2007. Our understanding is that the language in the bill is as set forth in Appendix A.

This replaces earlier language that would have required all states to audit 2% of all precincts under all circumstances. We believe the new language will give jurisdictions more confidence that they will catch programming errors, software bugs or attacks against voting systems. This audit scheme also seems to allow jurisdictions to develop other, innovative audit procedures on their own and still receive federal funding for such audits, as long as they are at least as effective as what is otherwise required. Finally, this scheme minimizes potential burdens on election officials by requiring increased levels of audits *only when races are exceptionally close*. Below we explain the reasons behind our consensus.

Discovery of Systemic Error vs. Confidence Level and the Development of the Tiered Auditing Approach

Some of your colleagues may want to know what percentage of precincts must be audited in order to ensure that there is not an "unacceptable" level of error.

In truth, it may be that attempting to prevent an "unacceptable" level of error on electronic voting machines through audits is too administratively burdensome. This is particularly true if we assume that a certain number of votes (e.g., 10 % or 20%) can be miscounted in a single polling place without giving rise to an independent investigation,

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[*] The authors' affiliations are provided for identification purposes only. The views expressed in this memorandum are the authors' personal views. The authors do not purport to represent the views of their respective institutions.

and that some errors will be "clumped" into a relatively small number of precincts, rather than spread evenly among them.

Thus, we might say that the miscounting of 1% of all votes in a federal race is "unacceptable." In an imagined typical congressional district, with 400 precincts of roughly equal size, we would need to audit more than 10% of all precincts to have at least 90% confidence that an audit would discover an error causing a miscounting of 1% or more of the votes.

Mandating a 10% audit for all races would be a high burden on many States. And in the vast majority of races, a shift of 1% of the votes would not alter the outcome of the race. For that reason, we might say that while less than ideal, we are willing to live with the risk that audits will not catch the 1% counting error in races where such an error is not going to change the outcome of the race.

But in races decided by less than 1% (in recent history, this has represented less than one percent of all federal elections), we might say we are *unwilling* to accept this risk.

Typical Congressional District

It is therefore worth considering how well the tiered approach will perform if we ask how likely audits in this scheme are to detect errors that would change the outcome of a specific race. The table below gives the probabilities of detecting discrepancies in 2, 3, 5 and 10% post-election audits in a typical congressional district with 400 precincts for races with margins ranging from 0.5% to 5.0% (Note: the highlighted numbers give confidence levels for audits conforming to the tiered approach of the Voter Confidence and Increased Accessibility Act of 2007.)[1]

No. of precincts	Margin of victory	Probability in a 2% audit	Probability in a 3% audit	Probability in a 5% audit	Probability in a 10% audit
400	0.50%	10%	14%	22%	41%
400	0.75%	15%	22%	34%	58%
400	1.00%	18%	27%	47%	66%
400	1.75%	31%	43%	61%	86%
400	2.00%	33%	46%	65%	89%
400	5.00%	66%	80%	94%	99.6%

As you can see from this chart, in cases of narrow margins, adopting the tiered approach could give the public and jurisdictions considerably greater confidence that result-changing errors were caught than would a fixed-percentage audit, without putting an unreasonable burden on the vast majority of districts.

Minimizing the Burden on Election Officials

This tiered audit approach has the benefit of providing increased security in close elections without placing an undue burden on election officials. We can see this in the chart below, which shows the number of Congressional races in recent history with margins that would have triggered the tiered audits set forth in the Act. If your audit

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[1] These calculations assume that a vote shift of 20% or more within a single precinct will be detected.

scheme were required in the last three federal elections, the number of expanded audits would have been exceedingly small.

Year	Federal Races Requiring 3% Audit (decided by more than 2% margin)	Federal Races Requiring 5% audit (decided by between 1% and 2% margin)	Federal Races Requiring 10% audit (decided by between 0% and 1%).
2002	461	3	4
2004	509	6	4
2006	452	8	8

Thus, we see that in 2002, 2004, and 2006, having a tiered audit procedure as proposed in the Holt bill would have a cost that is negligibly increased compared to a flat audit of 3%, since almost all of the races would be audited at the 3% level anyway (the first tier). The extra cost of performing some audits in the second and third tier contributes about 1/30th of the total audit cost.[2] Although having a tiered approach adds some complexity to the process, it does not add significantly to the cost of doing the audits; yet it greatly increases one's confidence that election results are correctly reported for all races—even close races.

The tiered audit scheme adopted by the Holt Bill reasonably balances a number of interests: confidence in election results, deterrence of electoral fraud, audit cost, innovation in new audit designs, and the burdens of administrability and frequency of increased percentage audits.

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[2] This calculation assumes that costs of increased audits increased linearly with audit percentage.

The text of the tiered audit used by the Voter Confidence and Increased Accessibility Act of 2007:

(a) IN GENERAL.—Except as provided in subsection (b), the number of voter-verified paper ballots which will be subject to a hand count administered by the Election Audit Board of a State under this subtitle with respect to an election shall be determined as follows:

(1) In the event that the unofficial count as described in section 323(a)(1) reveals that the margin of victory between the two candidates receiving the largest number of votes in the election is less than 1 percent of the total votes cast in that election, the hand counts of the voter-verified paper ballots shall occur in 10% of all precincts (or equivalent locations) in the Congressional district involved (in the case of an election for the House of Representatives) or the State (in the case of any other election for Federal office).

(2) In the event that the unofficial count as described in section 323(a)(1) reveals that the margin of victory between the two candidates receiving the largest number of votes in the election is greater than or equal to 1 percent but less than 2 percent of the total votes cast in that election, the hand counts of the voter-verified paper ballots shall occur in 5% of all precincts (or equivalent locations) in the Congressional district involved (in the case of an election for the House of Representatives) or the State (in the case of any other election for Federal office).

(3) In the event that the unofficial count as described in section 323(a)(1) reveals that the margin of victory between the two candidates receiving the largest number of votes in the election is equal to or greater than 2 percent of the total votes cast in that election, the hand counts of the voter-verified paper ballots shall occur in 3% of all precincts (or equivalent locations) in the Congressional district involved (in the case of an election for the House of Representatives) or the State (in the case of any other election for Federal office).

(b) USE OF ALTERNATIVE MECHANISM.—Notwithstanding subsection (a), a State may adopt and apply an alternative mechanism to determine the number of voter verified paper ballots which will be subject to the hand counts required under this subtitle with respect to an election, so long as the National Institute of Standards and Technology determines that the alternative mechanism will be at least as effective in ensuring the accuracy of the election results and as transparent as the procedure under subsection (a).