

## **How to effectively pre-test blank ballots in the Hart InterCivic optical scan system**

Paul Walmsley / April 8, 2005

1. Boulder County presently uses the Hart InterCivic “BallotNow” optical scan system to interpret and tabulate votes.
2. Problems associated with this system caused Boulder County to release election results in the 2004 general election several days late and at considerable additional cost.
3. One portion of the problem was apparently caused by variances in the printing of the paper ballots.
4. These variances, invisible to the naked eye, apparently caused the scanner machines to reject some ballots as “damaged,” causing delays and extra work.
5. Boulder County may continue to use the Hart BallotNow system for future elections. If it does, and if it is assumed that these printing variances were in fact the source of the damaged ballot problems, it seems prudent for Boulder County to seek a method to test blank paper ballots before they are used in future elections.
6. Using the existing scanners and software, I believe that it may be possible to test a small sample of these blank ballots ahead of time to determine whether the entire batch of paper ballots will scan without being considered “damaged.”
7. This process can be done without marking the ballots or otherwise preventing them from being used in the “live” election.
8. First, a small random sample of the ballots would be pulled from the printed stacks. The size of this sample can vary depending on the level of assurance that Boulder County requires. Very high levels of assurance can be obtained by testing only a few

hundred ballots.

9. The sample must be truly random in the statistical sense. Examples of truly random number sources could include a secure random number generator device, a set of casino-grade dice, a book of numbers from a random source, or a lottery number generator machine.
10. To conduct the test, the sample of blank ballots would be fed through the scanners.
11. Each ballot should result in the machine assessing a set of *non-damaged undervotes* for each race.
12. If the scanning machines interpret any ballot as being anything other than a set of non-damaged undervotes, the entire lot of ballots must be rejected, as the lot is likely to cause scanning errors during the election.
13. If every ballot in the sample passes the test successfully, Boulder County can conclude with a high degree of confidence that there are very few ballots which have printing errors that will cause scanner problems.
14. This auditing plan is based on a well-known, peer-reviewed acceptance sampling plan written by a fellow of the American Statistical Association and the American Society for Quality Control.
15. I suggest that the Committee recommend the use of this plan – or some similar method – to detect misprinted ballots in future Boulder County elections.
16. I would be pleased to present this plan in further detail at a later date if the Committee requests.