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The Election Integrity folks in Tucson have developed some automated tools for finding anomalies in Diebold/Premier GEMS databases. We want to share this capability. So I want to encourage you to file a public records request for the 2008 general election electronic databases in your jurisdiction as a means of gaining more transparency into the vote tabulation process. I'm hoping the information here will provide some incentive to do so.

As you may recall, a 2007 public records lawsuit in Pima County, AZ resulted in the release of hundreds of Diebold/Premier GEMS database files going back to 2002. Since their release, we have become familiar with the content of these databases, written some software to automate some of the inspection and done some initial analysis of a few elections.

These databases reveal quite a lot about the electronic counting of an election. The GEMS databases are MS Access files consisting of about 50 tables. While they appear to be quite complicated, most of the tables are set up prior to counting; they define ballot layouts, races, candidates, voting areas, precincts, etc. There are very few tables that play a direct role in vote tabulation and report creation.

Here in Pima County, the election database is backed up almost every day beginning with the counting of early ballots several days prior to Election Day. During the course of an election, there will thus be a sequence of database backups, each of which provides a snapshot of the state of the election at that time. This sequence of databases makes it possible to do some straightforward sanity checking. For example, we can check to see if

- 1) any static part of the database has changed over time (e.g., the order of candidates and their code numbers)
- 2) certain records in the vote tabulation tables have changed over time (e.g., number of votes for candidate X in precinct Y in ballot batch Z)
- 3) vote and ballot counts have decreased as counting proceeds
- 4) precinct memory cards have been uploaded more than once
- 5) files have been overwritten (e.g., overwriting a backup file)
- 6) improper summary reports (showing vote totals) have been printed
- 7) any statistical anomalies appear (e.g., incremental vote distributions change dramatically).

In one controversial 2006 bond election in Pima County, we have found several of these anomalies. By looking at the Audit Log table, we saw that a backup file was made at the end of the first day of counting early ballots. The next morning,

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before any counting had commenced, this backup file was overwritten by another backup with the same name. In comparison with other elections, the making of a morning backup is highly unusual. The Audit Log table also showed that Summary Reports were printed prior to Election Day. This means that someone was looking at election results before the closing of the polls. Since they were printed, it is possible they were illegally given to someone else.

Comparing two successive databases, we discovered anomalous increases and decreases in vote tallies for every candidate and issue on the ballot. Ballot counts also both increased and decreased in several precincts. How can ballot counts decrease between successive databases?

We also discovered that at least 23, and possibly 31, precinct memory cards were uploaded twice, once on election night, and once four days later and, not surprisingly, that these precincts were where the ballot and vote counts changed. Although the numbers do not indicate any change in election results, there was a strange gap in backup files from the afternoon of Election Day to three days later, so we cannot be sure that memory card uploads occurring just before that oddly late backup had no effect on the outcome.

The County election officials do not have any explanation for these anomalies. There is a push here to have that election recounted because of these and a host of other anomalies.

We think it is important that political parties, campaigns, and election officials become aware that the databases provide useful insights into the election process. If more databases are released in more jurisdictions, and the analysis tools become more automated and more available, we think there will be a significantly reduced opportunity for fraudulent manipulation and a much greater likelihood that software bugs and other error sources will be exposed.

If GEMS databases are released as a result of your efforts, we will be happy to analyze them using the tools we have developed. Unfortunately, this software is primitive and not yet ready for distribution. Although our experience is limited to GEMS databases, it should be possible to analyze databases from other vendors in a similar manner although the window into the election process will depend on the database design.

If you wish to contact us regarding our analysis capability, please contact me at tomwryan@gmail.com or send a message to ElectionIntegrity@earthlink.net. Please feel free to forward this information to others.