MEMORANDUM

TO: Mayor and City Council

FROM: Shirley A. Brown, City Clerk

DATE: February 28, 2005

SUBJECT: Initiative Petition

The Office of the City Clerk received a supplement to the petition for An Ordinance Repealing and Replacing Code Chapter 10-6 Relating to Smoking in Public Places, Creating Offenses, and Providing Penalties on February 22, 2005 at 9:45 a.m. For an initiative to be on a ballot, Article IV, Section 1 of the Charter of the City of Austin requires that a petition must be signed by a number of qualified (registered) voters of the city equal to at least ten percent of the number of qualified voters of the city, or 36,764 qualified voters.

The petition (including the supplement) contained 6,784 pages with a total of 41,499 lines of names. The validation process was completed on February 28. A random statistical sample method of validation was used. Twenty-five (25) percent (or 10,395) of the lines of names submitted were randomly selected and were verified against the voter registration databases of Travis and Williamson counties. Currently there are no registered voters in the area of Austin that is located in Hays county.

Based on that sample, the consultant report estimated 37,978 of the signers are registered voters residing in Austin. It is estimated that 3,521 lines of names on the petition do not contain valid signatures of qualified voters of the city. There are a sufficient number of signatures of qualified voters of the city on the petition to meet the requirements of Article IV, Section 1 of the City Charter.

Cc: Toby Futrell
     David Smith
     Jenny Gilchrist
     Brad Norton
     Kristen Vassallo
     Dr. Tom Sager
     Rodney Ahart

Final Report on Analysis of Smoking Petition

We estimate that there are 37,978 valid signatures on the original smoking petition and supplement. Using a random sample of a size required by law, the City is 95% confident that the true number of valid signatures on the entire petition exceeds 37,618 and is virtually certain that the true number exceeds the required minimum of 36,764.

A total of 41,499 lines of names were submitted on the original petition and supplement. A random sample of 10,395 of these lines was checked. 303 of the sample lines were disqualified on account of bearing signatures of persons not on the voter list (300) or of not bearing signatures (3). The remaining 10,092 sample lines were validated as bearing signatures of qualified voters. However, 150 qualified voters signed more than once: 144 signed twice, 5 signed three times, and one signed four times. Therefore, the sample contained the signatures of $10,092 - 144 - 2 \times 5 - 3 \times 1 = 9,935$ distinct qualified voters, counting each distinct voter's signature only once.

Using these figures, we estimate that there are 37,978 valid signatures on the smoking petition. The method used for calculating this estimate is based on Goodman's method, (*The Annals of Mathematical Statistics*, 1949, pp. 572-579) supplemented with variance estimate based on Haas and Stokes (*Journal of the American Statistical Association*, 1998, pp. 1475-1487.) It should be noted that the estimate of 37,978 valid signatures does not simply extrapolate the 9,935 valid signatures by multiplying 9,935 by the petition-to-sample-size ratio $41,499 \div 10,395$ (essentially 4). To do so would give a much larger estimate ($9,935 \times 41,499 \div 10,395 = 39,663$) of the number of valid signatures. The 39,663 estimate is substantially inflated because it does not deal properly with multiple signatures. An intuitive explanation is that multiplying by four misses many of the ways that signatures may be duplicated. Suppose the entire petition is divided into four equal quarters and each quarter is checked separately without regard to the other quarters. Then each quarter may contain duplicates in and of itself. But adding up the duplicates in the four quarters misses all duplicates that may occur between quarters. An apparently unique signature in one quarter can nevertheless be a duplicate by also occurring in any of the other three quarters. John Doe can be a duplicate because he appears twice within one of the quarters. But he can also be a duplicate by being a unique signature in any two different quarters. Multiplying by four counts only the duplicates within quarters and misses the duplicates between quarters. It is these inter-quarter duplicates that the 39,663 estimate does not adjust for. Still further adjustments are necessary for triplicate and quadruplicate signatures. The proportion of multiple signatures in the sample substantially understates the multiple signatures on the petition. Details on proper ways to adjust for multiple signatures are given in the cited references. The 37,978 estimate properly adjusts for all multiple signatures.

Random number generation for the sample and all programming were done with SAS® (Statistical Analysis System).