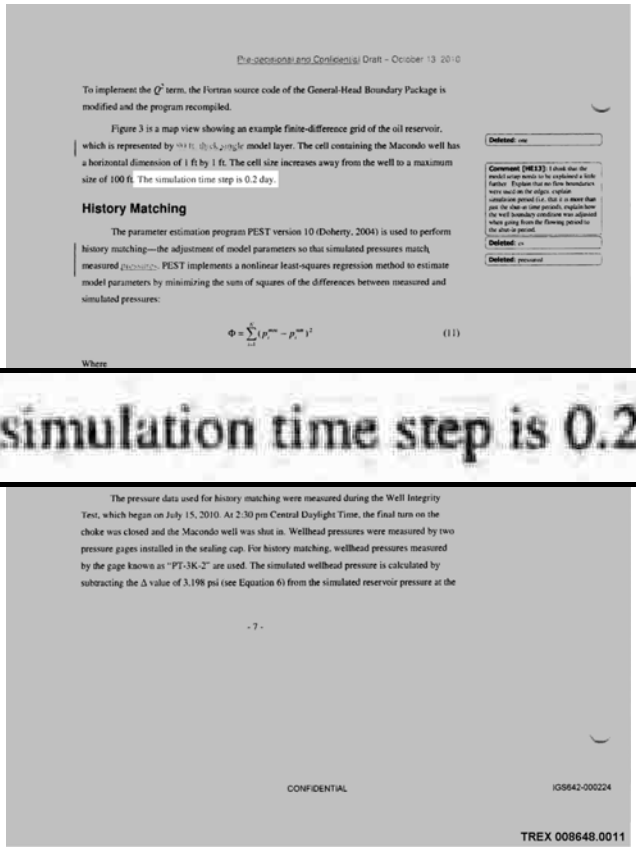

To implement the Q^2 term, the Fortran source code of the General-Head Boundary Package is modified and the program recompiled.

Figure 3 is a map view showing an example finite-difference grid of the oil reservoir, which is represented by one thick single model layer. The cell containing the Macondo well has a horizontal dimension of 1 ft by 1 ft. The cell size increases away from the well to a maximum size of 100 ft. The simulation time step is 0.2 day.

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Comment [MEI3]: I think that the model setup needs to be explained a little further. Explain that no-flow boundaries were used on the edges, explain simulation period (i.e. that it is more than just the shut-in time period), explain how the well boundary conditions were adjusted when going from the flowing period to the shut-in period.

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History Matching

The parameter estimation program PEST version 10 (Doherty, 2004) is used to perform history matching—the adjustment of model parameters so that simulated pressures match measured pressures. PEST implements a nonlinear least-squares regression method to estimate model parameters by minimizing the sum of squares of the differences between measured and simulated pressures:

$$\Phi = \sum_{i=1}^{n} (p_i^{meas} - p_i^{sim})^2 \qquad (11)$$

Where

. The simulation time step is 0.2 day.

The pressure data used for history matching were measured during the Well Integrity Test, which began on July 15, 2010. At 2:30 pm Central Daylight Time, the final turn on the choke was closed and the Macondo well was shut in. Wellhead pressures were measured by two pressure gages installed in the sealing cap. For history matching, wellhead pressures measured by the gage known as "PT-3K-2" are used. The simulated wellhead pressure is calculated by subtracting the Δ value of 3,198 psi (see Equation 6) from the simulated reservoir pressure at the