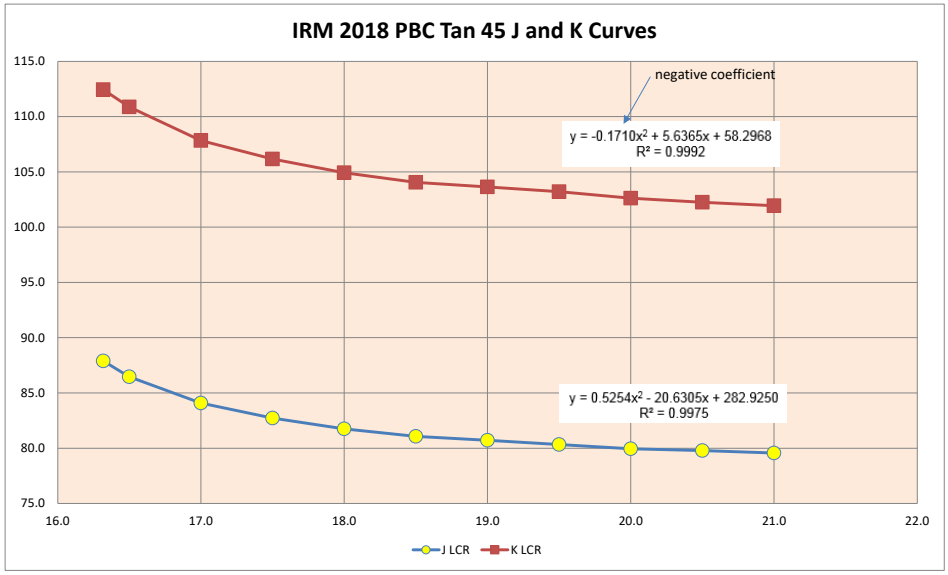
Updates to 2018 IRM Preliminary Base Case Results

There has typically been a small bump in one of the IRM-LCR curves in years' past. The bump in this year's curves in the preliminary base case results is shown in Figure 1 below appearing in the Zone K curve between the IRM points of 18.5% and 20%. While re-examining the Zone J and Zone K IRM-LCR curves, the NYISO observed that the equation for the curve with the best r-squared value had a negative coefficient for the first term in the quadratic equation. The results that the NYISO previously provided to the ICS were based on this equation and led to the results shown below in the first column of Table 1.

Figure 1 - 2018 Preliminary Base Case IRM-LCR Curves



A negative value for the first term co-efficient means that the parabola of the equation opens downward, like an umbrella, instead of the expected upward, like a cup, shape. The second column of Table 1 below shows the values of the regression analysis when the highest r-squared value—*i.e.*, the one with the negative coefficient here—is eliminated from consideration. Higher LCR values would be expected as the IRM value falls (moves to the left) along the IRM-LCR curves.

The third column of Table 1 below shows the values from a regression analysis conducted on tan 45 curves using the same PBC model but with the new GE software designed to steady the seeding order of resources in the model.[1]

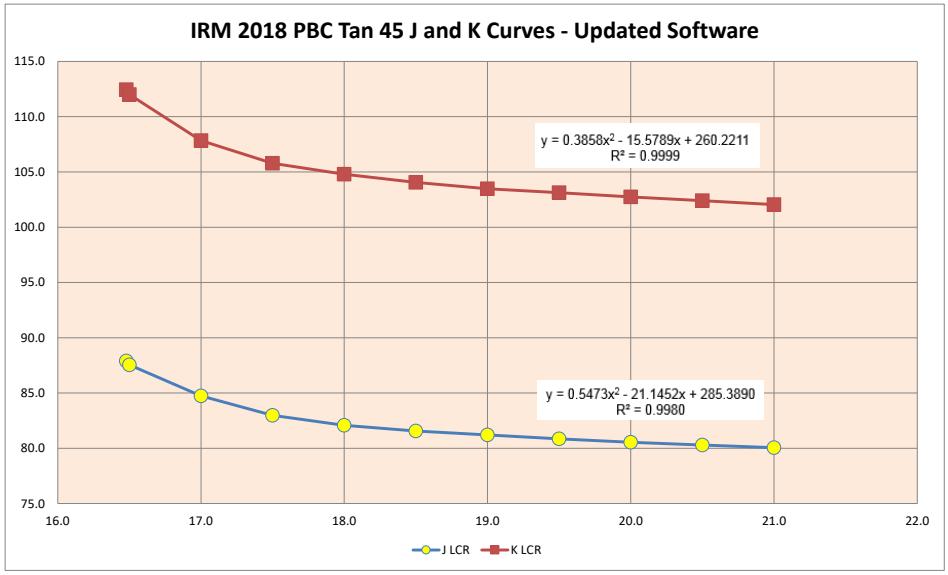
[1]http://www.nysrc.org/pdf/MeetingMaterial/ICSMeetingMaterial/ICS_Agenda%20199/GE%20MARS%20Random%20Seed%20Generation%20Algorithm.pdf

Table 1 – 2018 IRM and LCR Results of PBC with Updates

	Original PBC Results (%)	PBC Results with better points (%)	Updated Software Values (%)
NYCA	19.04	18.76	18.65
J	80.59	80.80	81.39
K	103.62	103.74	103.87

Figure 2 below shows the IRM-LCR curves of the updated software case. Note that the bump is of much lesser magnitude. The regression analysis performed on these curves resulted in no equations generated with negative first term coefficients.

Figure 2 - 2018 PBC IRM-LCR Curves with Updated MARS Software



Recommendation Going Forward

Although the new software version did not result in equations where there were negative coefficients, this should not imply that the anomaly described above could not happen again. The NYISO recommends that ICS consider a change to Policy 5-12, Appendix B that would disqualify equations with negative first term coefficients. A proposed red line version of Appendix B is attached below with the suggested change.

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APPENDIX B: IRM Anchoring Method

The IRM Anchoring Method identifies the NYCA IRM Requirements and related MLCR from IRM/LCR curves established by the Unified Methodology. The *anchor point* on the curve is selected by applying a tangent of 45 degrees ("Tan 45") analysis at the bend (or "knee") of the curve as shown on Figure B-1 below. Based on these curves, extreme points on the curve on either side of the Tan 45 point may create disproportionate changes in LCR and IRM, since small changes in LCR can introduce larger changes in IRM Requirements and vice versa. A regression analysis is utilized to best fit the IRM/LCR curves and determine the Tan 45 point, rather than a visual inspection of the curves.

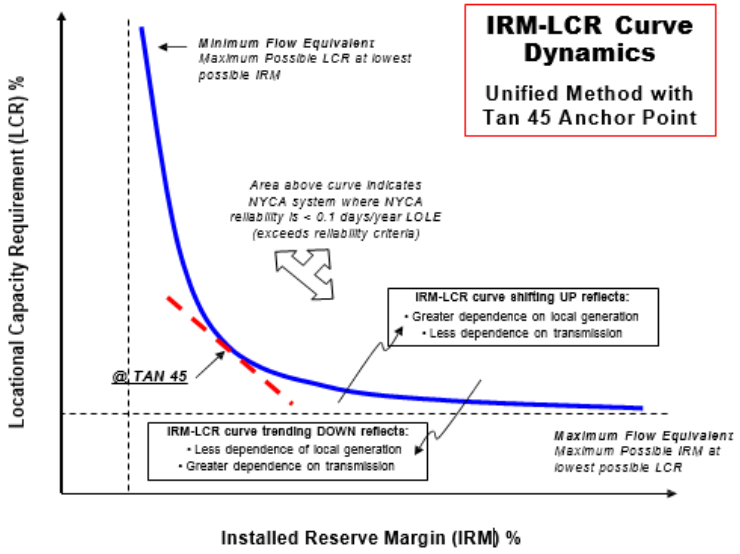

Figure B-1: IRM-LCR Unified Method Curve Dynamics with Tan 45 Anchor Point

The IRM/LCR characteristic consists of a curve function, "a knee of the curve" and straight line segments at the asymptotes. The curve function is represented by a quadratic (second order) curve which is the basis for the Tan 45 inflection point calculation. Inclusion of IRM/LCR point pairs remote to the "knee of the curve" may impact the calculation of the quadratic curve function used for the Tan 45 calculation.

The procedure for determining the best fit curve function used for the calculation of the Tan
45 inflection point to define the base case requirement is based on the following methodology:

1) Start with all points on IRM/LCR Characteristic.
2) Develop regression curve equations for all different point to point segments consisting of at least four consecutive points.
3) Rank all the regression curve equations based on the following:
   - Sort regression equations with highest R^2.
   - Remove any equations which show a negative coefficient in the first term. This is the constant labeled 'a' in the quadratic equation: ax^2+bx+c
   - Ensure calculated IRM is within the selected point pair range, i.e., if the curve fit was developed between 14% and 18% and the calculated IRM is 13.9%, the calculation is invalid.
   - In addition, there must be at least one statewide reserve margin point to the left and right of the calculated tan 45 point
   - Ensure the calculated IRM and corresponding LCR do not violate the 0.1 LOLE criteria.
   - Check results to ensure they are consistent with visual inspection methodology used in past years studies.

This approach identifies the quadratic curve functions with highest R^2 correlations as the basis for the Tan 45 calculation. The final IRM is obtained by averaging the Tan 45 IRM points of the NYC and LI curves. The Tan 45 points are determined by solving for the first derivatives of each of the "best fit" quadratic functions as a slope of -1. Lastly, the resulting MLCR values are identified.