Purpose: We have developed a Cimmino algorithm to calculate the percentage depth dose (PDD) of spread-out Bragg peaks (SOBP) for mega voltage proton beams.

Method and Materials: For patient underwent clinical proton treatment using scattered beams, it is often desirable to determine the shape of SOBP PDD for determination of dose at points away from the beam modulation width. For patient prescription, the SOBP is often prescribed by two parameters, the range of SOBP, R, defined as the distance from the surface to the distance that corresponding to 90% of the maximum dose and the modulation width of SOBP, M, defined as the width of the uniform dose within 90% of the maximum dose. Often, the shape of the SOBP PDD is unknown and has to be calculated from the file that determines the temporal dependence of nozzle equivalent thickness (NET) profiles of the energy modulation wheel. We have developed a Cimmino algorithm to calculate the SOBP PDD from the pristine PDD by constraint the PDD to be constant within M and have a range of R.

Results: *SOBP PDD* calculated by the Cimmino algorithm agrees reasonably well with SOBP PDD determined from the modulation wheel. They agree at most depths and are slightly different at the entrance. The difference is attributed to the difference in weighing the pristine PDD.

Conclusion: This algorithm is ideally suitable for calculating SOBP PDD suitable for patient-specific MU verification for proton beams. As a result, one no longer needs the energy modulation file output for calculation of dose at arbitrary depth.