Algorithm for Calculation of Site road/vehicle noise assessment, in accordance with 24 CFR Part 51. Sound source level for automobiles = \( AE = 64.6 + 20 \log_{10}[S] - 15 \log_{10}[D] \), Sound source level for medium sized trucks = \( AE = 74.6 + 20 \log_{10}[S] - 15 \log_{10}[D] \), Heavy trucks when \( S \leq 50 \text{ mph} \), \( AE = 114.5 - 15 \log_{10}[D] \), Heavy trucks when \( S > 50 \text{ mph} \), \( AE = 80.5 + 20 \log_{10}[S] - 15 \log_{10}[D] \). Day/Night Automobile Sound Level = \( \text{DNL} = AE + 10 \log_{10}[EADT*(d+10*n)] - 49.4 \), where \( d = \text{daytime fraction of ADT} \), \( n = \text{nighttime fraction of ADT} \); \( d = 1 - n \); \( \text{ADT} = \text{Average Daily Traffic} \), \( \text{EADT} = \text{Effective Average Daily Traffic} \). \( \text{EADT} \) for heavy trucks = \( \text{ADT} \)*(factor from table#8-HUD noise guidebook), \( \text{EADT} \) for medium sized trucks = \( \text{ADT} \)*DTS equation, \( \text{EADT} \) for cars = \( \text{ADT} \)*DTS equation, DTS equation=distance to stop sign equation= \( 0.1 + 0.9*(DTS/600) \), DTS=distance from the proposed HUD site to stop sign; Gradient Adjustment Factor for DNL determination on heavy trucks (GAF) = \((\% \text{ Road Gradient})^{0.5} - 1\) – REVISED -1-14-08
Algorithm for Calculation of Day-Night locomotive sound levels, in accordance with 24 CFR Part 51B. Sound source level for electric engines and rail cars = \( AE = 71.4 + 20 \times \log_{10}[S] + 10 \times \log_{10}[N2] - 15 \times \log_{10}[Dl] \). \( N2 = ne + nc \), where \( ne \) = # of electric engines and \( nc \) = # of cars. Note: An electric engine is counted as a rail car. Adjusted Average Train Operations (Railroad) = \( AATOr = \) Average Train Operations (ATO) times 100. Adjusted Average Train Operations (Total) = \( AATO \) total = \( AATO \) (railroad) + \( ATO \) times 4. Day/Night Electric Engine and Rail Car Sound Level = \( DNL = AE + 10 \times \log_{10}[AATO_{\text{total}} \times (d + 10 \times N)] - 49.4 \), where \( d \) = daytime percent use of \( AATO \), \( N \) = night time percent use of \( AATO \), \( D = 100\% - N \) – \( RRDNL \) = Rail Road DNL.

**Data Input:**
- Identify
  - HUD site
- \( N2 = \) sum of electric engines and rail cars = \( ne + nc \)
- \( AE = \) sound source level for electric engines
- \( D = \) daytime % of ATO
- \( D = 100\% - N \)
- \( AATOr = \) ATO times 100
- \( AATO_{total} = AATO \) (railroad) + \( ATO \) times 4
- \( AATO_{railroad} = \) ATO times 100
- \( AATO_{total} = \) AATO (railroad) + \( ATO \) times 4

**Yes**
- Calculate:
  - \( N2 = \) sum of electric engines and rail cars = \( ne + nc \)
  - \( AE = \) sound source level for electric engines
  - \( D = \) daytime % of ATO
  - \( D = 100\% - N \)

**No**
- Calculate:
  - \( RRDNL \) = Rail Road DNL
- Calculate:
  - Site DNL
- Calculate:
  - Total Train DNL = DNL from electric engines and rail cars
- Calculate:
  - Total Train DNL = DNL from electric engines and rail cars

**DATA INPUT:**
1) Railroad Track Identifier
   - Route name or destination
2) \( ne \) = # of electric engines
   - (default = 1)
3) \( nc \) = # of cars per train
   - (default = 8)
4) \( S \) = average train speed
   - (default = 30 MPH)
5) \( DL \) = distance from proposed HUD project site to center of tracks
6) \( ATO \) - average train operations
7) \( N \) = nighttime % of ATO
   - (default = 0.15 or 15%)
8) Railway horns (Y or N)
9) Bolted track (Y or N)

**REVISIONS:**
- 12-17-08
Algorithm for Calculation of Day-Night locomotive sound levels, in accordance with 24 CFR Part 51B. Sound source level for diesel engines = \( AE = 141.7 - 10 \times \log_{10} [S] + 10 \times \log_{10} [N1] - 15 \times \log_{10} [Dl] \). Sound source level for rail cars = \( AE = 71.4 + 20 \times \log_{10} [S] + 10 \times \log_{10} [N2] - 15 \times \log_{10} [Dl] \). Adjusted Average Train Operations (Engines) = \( \text{AATOe} = \text{Average Train Operations (ATO)} \times 10 \). Adjusted Average Train Operations (Rail cars) = \( \text{AATOC} = \text{Average Train Operations (ATO)} \times 4 \). Day/Night Diesel Engine (DNLe) or Rail Car (DNLc) Sound Level = \( AE + 10 \times \log_{10} [\text{AATO(car or engine)} \times (D + 10 \times N)] - 49.4 \), where \( D \) = daytime percent use of AATO, \( N \) = night time percent use of AATO, \( D=100\%-N \) – RRDNL = Rail Road DNL REVISITED – 12-17-08