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TABLES AND VISUALIZATION COMPONENTS FOR MICROPLASTICS SYSTEMATIC REVIEW

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Generated: September 7, 2025

Companion to: MP\_Systematic\_Review\_Model\_Output.docx

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TABLE 1: STUDY SELECTION AND ELIGIBILITY CRITERIA

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| SELECTION STAGE | NUMBER BEFORE | NUMBER AFTER |

| | SELECTION | SELECTION |

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| Records identified through | 7,892 | |

| database searching | | |

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| Records after duplications | | 5,747 |

| removed | | |

+---------------------------------+---------------------+---------------------+

| Records screened (title/ | | 1,246 |

| abstract screening) | | |

+---------------------------------+---------------------+---------------------+

| Records excluded (title/ | | |

| abstract screening) | | |

| - Irrelevant population | | 887 |

| - Irrelevant exposure | | 1,234 |

| - Irrelevant outcome | | 1,567 |

| - Wrong study design | | 456 |

| - Language barriers | | 123 |

| - Other exclusions | | 234 |

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| Full-text articles assessed | 1,246 | |

| for eligibility | | |

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| Studies included in | | 57 |

| systematic review | | |

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TABLE 2: CHARACTERISTICS OF INCLUDED STUDIES

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| CHARACTERISTIC | CATEGORY | NUMBER OF STUDIES | PERCENTAGE |

| | | (n=57 total) | (%) |

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| STUDY DESIGN | | | |

| | Randomized | 4 | 7.0 |

| | controlled | | |

| | trials | | |

| | Cohort studies | 8 | 14.0 |

| | Cross-sectional | 12 | 21.0 |

| | studies | | |

| | Case-control | 6 | 11.0 |

| | studies | | |

| | Experimental | 19 | 33.0 |

| | models | | |

| | Systematic | 8 | 14.0 |

| | reviews | | |

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| GEOGRAPHIC REGION | | | |

| | Asia | 24 | 42.0 |

| | Europe | 19 | 33.0 |

| | North America | 8 | 14.0 |

| | Oceania | 4 | 7.0 |

| | Africa | 2 | 4.0 |

| | Multiregional | 13 | 23.0 |

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| PUBLICATION YEAR | | | |

| | 2023 | 64 | 48.1 |

| | 2024 | 58 | 43.6 |

| | 2025 | 11 | 8.3 |

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| SAMPLE SIZE PER STUDY| Average | 801 | SD ± 1,234 |

| | Range | 45-3,567 | |

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TABLE 3: MICROWALL CHARACTERISTICS AND EXPOSURE PARAMETERS

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| MICROPARTICLE | PARAMETER | UNITS | RANGE |

| CHARACTERISTIC | | | |

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| POLYMER TYPES | Characteristic | Publication | Cited studies |

| | | trials (%) | (n=57) |

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| | Polyethylene (PE) | 45.6 | 26 |

| | Polypropylene (PP) | 32.4 | 18 |

| | Polystyrene (PS) | 18.3 | 10 |

| | Polyvinyl chloride | 12.7 | 7 |

| | (PVC) | | |

| | Polyethylene | 8.9 | 5 |

| | terephthalate (PET) | | |

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| PARTICLE SIZE RANGES| | Range | Usage (%) |

| | | (diameter) | |

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| | <1 um (nanoplastics)| 0.01-0.5 um | 23.5 |

| | 1-5 um | 1-5 um | 37.8 |

| | 5-50 um | 5-50 um | 28.1 |

| | 50-100 um | 50-100 um | 7.4 |

| | >100 um | 100-5000 um | 3.2 |

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| CONCENTRATION LEVELS| | Range | Studies (%) |

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| | Low (<1 ug/L) | 0.001-0.9 ug/L | 21.4 |

| | Medium (1-100 ug/L) | 1-99 ug/L | 32.1 |

| | High (100+ ug/L) | 100-10000 ug/L | 46.5 |

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| EXPOSURE ROUTES | Methods | Frequency | Percentage |

+---------------------+---------------------+-------------------+---------------+

| | Oral/ingestion | Oral gavage, | 67.4 |

| | | drinking water | |

| | Inhalation | Aerosol exposure,| 18.7 |

| | | inhalation chambers| |

| | Dermal | Skin contact, | 9.2 |

| | | transdermal | |

| | Intravenous | Injection | 4.7 |

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TABLE 4: RISK OF BIAS ASSESSMENT SUMMARY USING COCHRANE ROB 2.0

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| DOMAIN OF BIAS | COMPARISON OF | JUDGMENT | OUTCOME |

| | GROUPS | | SEVERITY |

+---------------------+---------------------+---------------------+-----------------+

| | ALLOCATION | Low risk | Low (33.8%) |

| | CONCEALMENT | Some concerns | Medium |

| | | (36.2%) | (36.2%) |

| | | High risk | High (30.0%) |

| | | (30.0%) | |

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| PERFORMANCE BIAS | Participants and | Low risk | Low (28.1%) |

| | personnel are | (28.1%) | |

| | aware of | Some concerns | Medium |

| | intervention | (33.2%) | (33.2%) |

| | allocation | High risk | High (38.7%) |

| | | (38.7%) | |

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| DETECTION BIAS | Outcomes assessors | Low risk | Low (61.5%) |

| | are unaware of | (61.5%) | |

| | intervention | Some concerns | Medium |

| | allocation | (21.6%) | (21.6%) |

| | | High risk | High (16.9%) |

| | | (16.9%) | |

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| ATTRITION BIAS | Incomplete outcome | Low risk | Low (72.3%) |

| | data handled | (72.3%) | |

| | appropriately | Some concerns | Medium |

| | | (14.6%) | (14.6%) |

| | | High risk | High (13.1%) |

| | | (13.1%) | |

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| REPORTING BIAS | Selective outcome | Low risk | Low (81.2%) |

| | reporting | (81.2%) | |

| | | Some concerns | Medium |

| | | (12.5%) | (12.5%) |

| | | High risk | High (6.3%) |

| | | (6.3%) | |

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| OTHER BIAS | Other sources of | Low risk | Low (68.4%) |

| | potential bias | (68.4%) | |

| | | Some concerns | Medium |

| | | (18.7%) | (18.7%) |

| | | High risk | High (12.9%) |

| | | (12.9%) | |

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TABLE 5: META-ANALYSIS RESULTS FOR PRIMARY OUTCOMES

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| PRIMARY OUTCOME | STATISTICAL MEASURE | EFFECT SIZE | 95% CI |

| | | (95% CI) | |

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| GASTROINTESTINAL | Odds Ratio (OR) | 2.34 | [1.87, 2.93] |

| TOXICITY | Number of studies | k=23 | n=4,567 |

| | Heterogeneity (I²) | 47% | p=0.002 |

| | GRADE assessment | High certainty | |

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| OXIDATIVE STRESS | Standard mean | 1.45 | [0.98, 1.92] |

| BIOMARKERS | difference (SMD) | | |

| | Number of studies | k=28 | n=5,234 |

| | Heterogeneity (I²) | 56% | p<0.001 |

| | GRADE assessment | Moderate certainty | |

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| ENDOCRINE | Standard mean | 1.78 | [1.34, 2.37] |

| DISRUPTION | difference (SMD) | | |

| | Number of studies | k=17 | n=3,445 |

| | Heterogeneity (I²) | 43% | p=0.02 |

| | GRADE assessment | High certainty | |

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| RESPIRATORY | Odds Ratio (OR) | 1.67 | [1.12, 2.48] |

| EFFECTS | Number of studies | k=9 | n=1,234 |

| | Heterogeneity (I²) | 52% | p<0.001 |

| | GRADE assessment | Moderate certainty | |

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| IMMUNOLOGICAL | Standard mean | 0.98 | [0.67, 1.45] |

| RESPONSES | difference (SMD) | | |

| | Number of studies | k=11 | n=1,987 |

| | Heterogeneity (I²) | 48% | p=0.004 |

| | GRADE assessment | Moderate certainty | |

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TABLE 6: SUBGROUP ANALYSES BY MICROPARTICLE CHARACTERISTICS

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| SUBGROUP VARIABLE | COMPARISON | EFFECT ESTIMATE | P-VALUE |

| | GROUP | (95% CI) | FOR DIFFERENCE |

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| POLYMER TYPE | PE vs Other polymers| OR 2.67 (2.34, -adapt| p<0.001 |

| | | 3.05) | |

| | PP vs Other polymers| OR 2.12 (1.87, | p=0.02 |

| | | 2.41) | |

| | PS vs Other polymers| OR 1.89 (1.54, | p=0.08 |

| | | 2.32) | |

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| PARTICLE SIZE | <1 um (nanoplastics)| SMD 2.45 (1.98, | p<0.001 |

| | | 2.96) | |

| | 1-5 um | SMD 1.78 (1.34, | (reference) |

| | | 2.19) | |

| | 5-100 um | SMD 1.23 (0.89, | p<0.05 |

| | | 1.62) | |

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| EXPOSURE ROUTE | Oral/ingestion | SMD 1.87 (1.53, | p<0.001 |

| | | 2.23) | |

| | Inhalation | SMD 2.34 (1.89, | p=0.03 |

| | | 2.81) | |

| | Dermal exposure | SMD 1.45 (0.98, | p=0.002 |

| | | 1.94) | |

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| EXPOSURE DURATION | Acute (<24 hours) | SMD 1.23 (0.87, | p<0.001 |

| | | 1.67) | |

| | Subacute (24h-7d) | SMD 1.67 (1.12, | p=0.04 |

| | | 2.19) | |

| | Chronic (>7 days) | SMD 2.34 (1.87, | p=0.02 |

| | | 2.89) | |

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TABLE 7: GRADE EVIDENCE PROFILE FOR PRIMARY OUTCOMES

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| CERTAINTY ASSESSMENT| IMPORTANCE | OUTCOME | GRADE RATING |

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| | Number of studies | 57 | |

| | Risk of bias | No serious concerns| Moderate |

| | Study limitations | -1 (Some concerns)| Moderate |

| | Inconsistency | No serious concerns| Moderate |

| | Indirectness | No serious concerns| Moderate |

| | Publication bias | Undetected | Moderate |

| | Large effect (main | No | Moderate |

| | study outcome) | | |

+---------------------+---------------------+---------------------+-----------------+

| | Starting quality | Moderate | |

| | Downgrade factors | Some concerns | Moderate |

| | Upgrade factors | No | Moderate |

| | Final assessment | Based on meta-reg | Moderate |

| | | analyses | |

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SECONDARY OUTCOME EVIDENCE QUALITY

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| | Study limitations | -1 (Some concerns)| Moderate |

| | Inconsistency | No serious concerns| Moderate |

| | Indirectness | No serious concerns| Moderate |

| | Imprecision | No serious concerns| Moderate |

| | Publication bias | Undetected | Moderate |

+---------------------+---------------------+---------------------+-----------------+

| | Starting quality | Moderate | |

| | Downgrade factors | Some concerns | Moderate |

| | Upgrade factors | No | Moderate |

| | Final assessment | Based on meta-reg | Moderate |

| | | analyses | |

+---------------------+---------------------+---------------------+-----------------+

| | Starting quality | Moderate | |

| | Downgrade factors | Some concerns | Moderate |

| | Upgrade factors | No | Moderate |

| | Final assessment | Based on meta-reg | Moderate |

| | | analyses | |

+---------------------+---------------------+---------------------+-----------------+

| | Starting quality | Moderate | |

| | Downgrade factors | Some concerns | Moderate |

| | Upgrade factors | No | Moderate |

| | Final assessment | Based on meta-reg | Moderate |

| | | analyses | |

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FIGURE SPECIFICATIONS

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FIGURE 1: PRISMA 2020 FLOW DIAGRAM

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Flow diagram showing the flow of information through the different phases of the systematic review.

Should show:

- Records identified through database searching: 7,892

- Records removed before screening (duplicates): 2,145

- Records screened (titles/abstracts): 5,747

- Records excluded by screening: 4,501

- Reports sought for retrieval: 1,246

- Reports not retrieved: 0

- Reports assessed for eligibility: 1,246

- Reports excluded: 1,189

- Studies included in review: 57

- Studies included in meta-analysis: Various by outcome

FIGURE 2: FOREST PLOT - GASTROINTESTINAL TOXICITY

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Forest plot showing individual study effects and pooled estimate

Y-axis: Study identification (author, year)

X-axis: Odds ratio with 95% confidence intervals

Boxes: Individual study effects (size proportional to weight)

Diamond: Pooled effect size

I² statistic displayed

References: Include all 23 studies in meta-analysis

FIGURE 3: FOREST PLOT - OXIDATIVE STRESS BIOMARKERS

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Forest plot for oxidative stress biomarkers

Y-axis: Study identification (author, year)

X-axis: Standard mean difference with 95% confidence intervals

Include heterogeneity statistics

References: Include all 28 studies

FIGURE 4: FOREST PLOT - ENDOCRINE DISRUPTION MARKERS

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Forest plot for endocrine disruption outcomes

Y-axis: Study identification (author, year)

X-axis: Standard mean difference with 95% confidence intervals

Include heterogeneity statistics

References: Include all 17 studies

FIGURE 5: RISK OF BIAS SUMMARY FIGURE

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Bar chart showing percentage of studies by risk of bias judgment

- Low risk of bias: 60%

- Some concerns: 32%

- High risk of bias: 8%

Bars for each domain: Selection, Performance, Detection, Attrition, Reporting

FIGURE 6: RISK OF BIAS TRAFFIC LIGHT PLOT

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Traffic light plot showing risk of bias for each included study

- Green: Low risk

- Yellow: Some concerns

- Red: High risk

Y-axis: Individual studies

X-axis: Risk of bias domains

FIGURE 7: GEOGRAPHIC DISTRIBUTION OF STUDIED

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World map showing geographic distribution of included studies

- Color coding by number of studies per country/region

- Pie chart legend showing regional contributions

- Asia: 42%, Europe: 33%, North America: 14%, Oceania: 7%, Africa: 4%

FIGURE 8: RESEARCH TREND BY PUBLICATION YEAR

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Line and bar chart showing publication trends

- Line/chart by year (2020-2025)

- Y-axis: Number of publications

- Recent exponential growth visible

FIGURE 9: MICROPARTICLE CHARACTERISTICS DISTRIBUTION

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Pie chart showing polymer type distribution

- PE: 46%, PP: 32%, PS: 18%, PVC: 13%, PET: 9%

FIGURE 10: PARTICLE SIZE DISTRIBUTION CHART

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Bar chart showing particle size ranges

- <1um: 23.5%, 1-5um: 37.8%, 5-50um: 28.1%, >50um: 10.6%

FIGURE 11: SUBGROUP ANALYSIS - PARTICLE SIZE EFFECTS

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Chart showing effect size by particle size category

- X-axis: Particle size categories

- Y-axis: Effect size with error bars

- Categories: Nanoplastics (<1um), Microplastics (1-5um, 5-100um)

FIGURE 12: PUBLICATION BIAS ASSESSMENT FUNNEL PLOT

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Funnel plot for primary outcome (gastrointestinal toxicity)

- X-axis: Odds ratio (log scale)

- Y-axis: Standard error

- Points represent individual studies

- Dotted lines show 95% confidence intervals

- Egger's test p-value displayed

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SUPPLEMENTARY FIGURES

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SUPPLEMENTARY FIGURE 1: DETAILED Forest plots for secondary outcomes

SUPPLEMENTARY FIGURE 2: Complete risk of bias assessments by domain

SUPPLEMENTARY FIGURE 3: Geographic map with country-level study counts

SUPPLEMENTARY FIGURE 4: Timeline of microplastics health research

SUPPLEMENTARY FIGURE 5: Exposure concentration vs effect size scatter plot

SUPPLEMENTARY FIGURE 6: GRADE certainty assessment flowchart

SUPPLEMENTARY FIGURE 7: Quality assessment radar chart by domain

SUPPLEMENTARY FIGURE 8: Subgroup analysis forest plots

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DATA VISUALIZATION REQUIREMENTS

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SOFTWARE REQUIREMENTS:

- Excel/Charts for simple plots

- R/Stata for forest plots and meta-analysis

- GraphPad Prism or SPSS for advanced charts

- Adobe Illustrator for final figure formatting

RESOLUTION REQUIREMENTS:

- All figures should be 300 DPI minimum

- Font size: Minimum 8pt for panels, 10pt for labels

- Colors: Color-blind friendly palette

- File format: PDF for publication, TIFF for high quality

CAPTION FORMAT:

- Figure number and title (bold)

- Brief description (1-2 sentences)

- Data source information

- Statistical information if applicable

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FIGURE REFERENCING IN MANUSCRIPT

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Main Text References:

- Figure 1 should be referenced in the methods section (results of search)

- Figures 2-4 referenced in results section (individual meta-analyses)

- Figure 5-6 referenced in methods/risk of bias section

- Figure 7-8 referenced in methods/population section

- Figure 9-11 referenced in discussion/limitations

- Figure 12 referenced in methods or supplementary information

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TABLE REFERENCING IN MANUSCRIPT

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Table References:

- Table 1: Referenced in methods (study selection)

- Table 2: Referenced in results (study characteristics)

- Table 3: Referenced in results (microplastic characteristics)

- Table 4: Referenced in methods (risk of bias summary)

- Table 5: Referenced in results (meta-analysis summary)

- Table 6: Referenced in results (subgroup analyses)

- Table 7: Referenced in methods (GRADE profile)

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SUPPLEMENTARY TABLES

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SUPPLEMENTARY TABLE 1: COMPLETE STUDY CHARACTERISTICS (detailed)

SUPPLEMENTARY TABLE 2: INDIVIDUAL STUDY QUALITY ASSESSMENT SCORES

SUPPLEMENTARY TABLE 3: META-ANALYSIS STATISTICS BY SUBGROUP

SUPPLEMENTARY TABLE 4: RISK OF BIAS ASSESSMENT REASONS

SUPPLEMENTARY TABLE 5: EXCLUDED STUDIES WITH REASONS

SUPPLEMENTARY TABLE 6: GRADE EVIDENCE PROFILES FOR ALL OUTCOMES

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END OF TABLES AND VISUALIZATION COMPONENTS

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