EPA-1633

Sheila Eckman/R10/USEPA/US
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To tom.crafford, sharmon.stafford, michael.daigneault, ruth.hamilton.heese, Paul.anderson2, williams, bandrew, lisa.reimers, newkgkvc, gandrewjr, newhalentribal, tpcrpr, tang, Guy_adema, Paul_burger, Jeff_shearer, ann_rappoport, Phil_brna, Lori_verbrugge, Keith.cox, Doug.limpinsel, T75murph, michelle.bonnet, Jean_gamache

cc Alan Boraas, "Rebecca S Shaftel", Bob Seal, catherine knott, Chris Frissell, Dan Rinella, Dave Athons, Gary Sonnevil, Heather Dean, Jenny Thomas, Phil North, Patricia McGrath, Palmer Hough, Rachel Fertik, Jeff Frithsen, Glenn Suter, Sheila Eckman, Richard Parkin, Gwen_Kittel, Paul_Burger, Jim Wigington, Thomas Fontaine, Barbara Butler, Doug.Limpinsel, Cindi Godsey, Guy_adema, tobias, Gunnar.Knapp, John.Duffield, mwiedmer, ann_rappoport, lori_verbrugge, michael_buntjer, Lorraine Edmond, Joe Ebersole, Kate Schofield, Jason Todd, Judy Smith, Tami Fordham

bcc

Subject Bristol Bay Watershed Assessment Conceptual Diagrams

Bristol Bay Intergovernmental Technical Team -

Attached to this message are the Conceptual Diagrams which will be used at next week's meeting to discuss the approach to the watershed assessment.

We suggest that those participating in the IGTT meeting start with the overview and summary concerning use of conceptual diagrams as tools for the Bristol Bay Assessment.

BBA Conceptual Diagram Introduction.pdf

The following files are the detailed conceptual diagrams: 1 = construction & operation / water quantity & habitat effects; 2 = construction & operation / water quality effects; 3 = post-closure / water quantity & quality effects; 4 = accidents & catastrophes. Conceptual diagrams 1 & 2 have preliminary identified high priority pathways highlighted. No high priority pathways are highlighted for conceptual diagrams 3 & 4 and we would like input from the Intergovernmental Team on which should be high priority.

If you cannot view or print these diagrams, don't worry. We will have poster-size diagrams at the meeting and will use those for our discussions.

BBA diagram 1_080111.pdf BBA diagram 2_080111.pdf BBA diagram 3_080111.pdf

BBA diagram 4_080111.pdf

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Using conceptual diagrams as tools for the Bristol Bay Assessment

A conceptual diagram is a visual representation of hypothesized relationships among human activities and the resulting sources, stressors, and responses—basically, it explicitly lays out how you think a system of interest is (or will be) working. These diagrams can be useful tools throughout an assessment, from structuring and clarifying initial brainstorming, to providing a framework for data collection and analysis, to organizing and presenting results.

Development of conceptual diagrams at the beginning of an assessment facilitates explicit, critical thinking about linkages among system components. Because these diagrams are always works-in-progress, to be revised and updated as the assessment progresses and information accumulates, they encourage transparency by providing a window into the assessment process.

Figure 1 provides a diagrammatic overview of the Bristol Bay Assessment. The assessment focuses on how environmental impacts associated with mine construction, operation, and long-term management (i.e., post-closure activities and maintenance) may affect salmon and resident fishes; effects on wildlife and human populations will be assessed in terms of fish-mediated impacts, although direct effects are recognized (dashed lines). We currently are developing four conceptual diagrams for mine life stage (mine construction & operation; post-closure management) and impact type (water quantity, sediment, and physical habitat; water quality) combinations, as well as a diagram illustrating potential effects of low probability but high impact accidents.

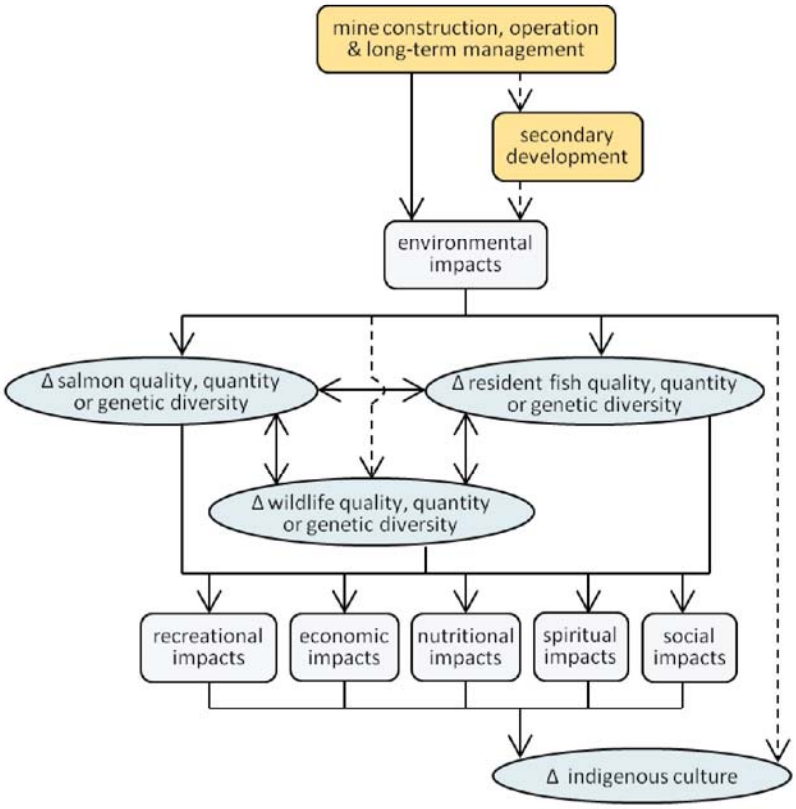

Figure 1. An overview of key components of the Bristol Bay Assessment (solid lines indicate focal pathways for the assessment).

Environmental impacts of mining in Bristol Bay: construction & operation, habitat effects
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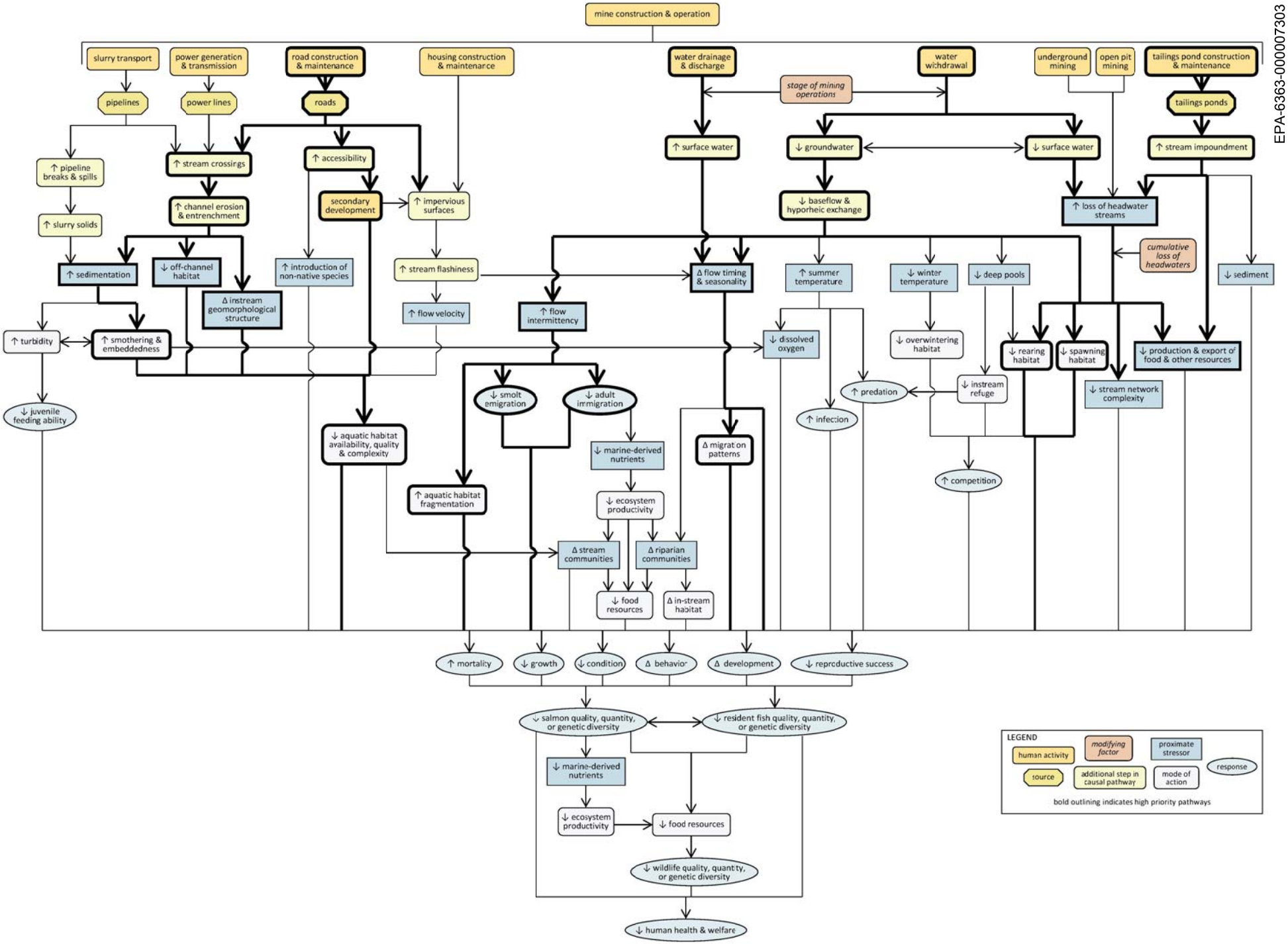

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Environmental impacts of mining in Bristol Bay: construction & operation, water quality effects

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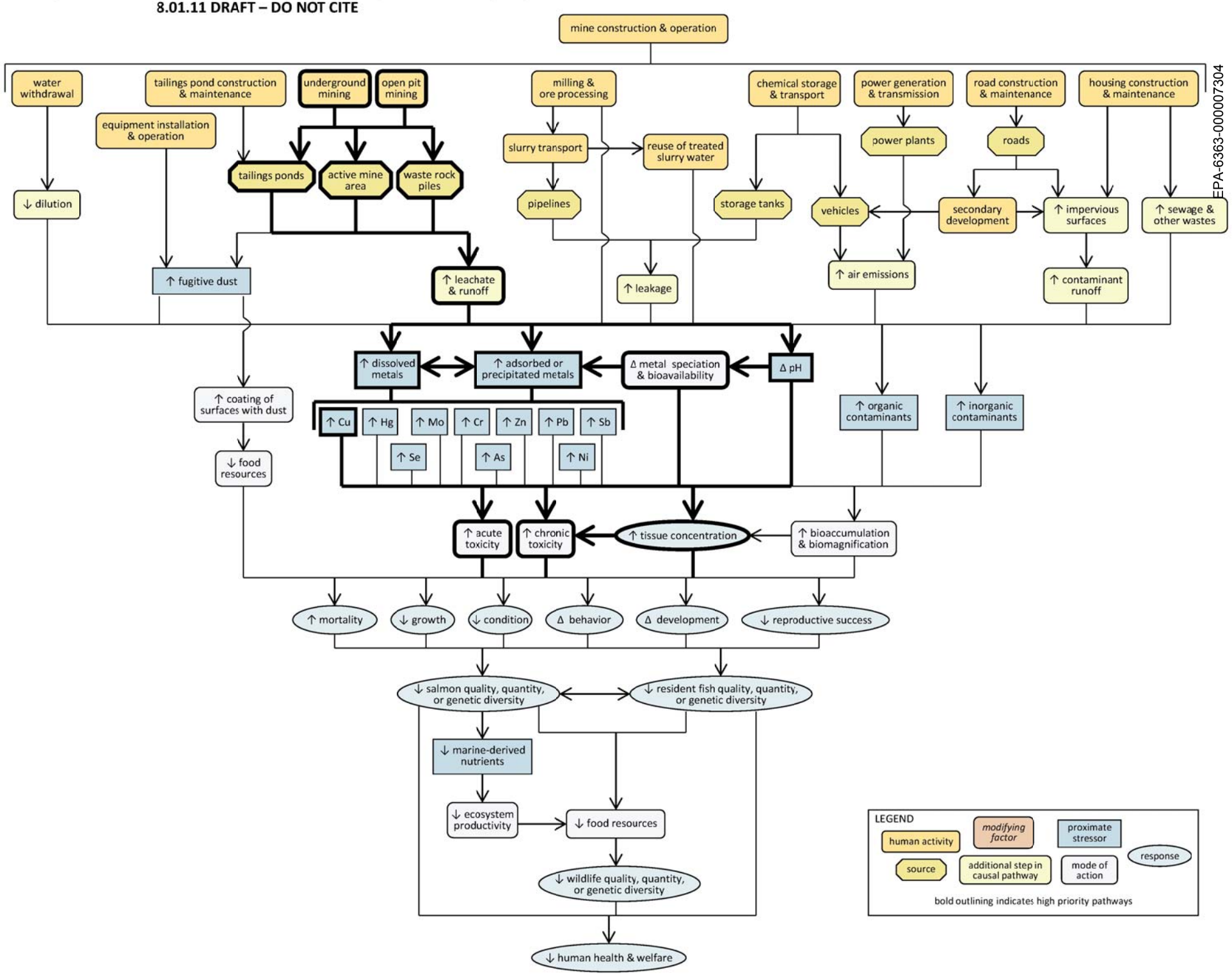

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Environmental impacts of mining in Bristol Bay: post-closure, water quantity/habitat & water quality effects
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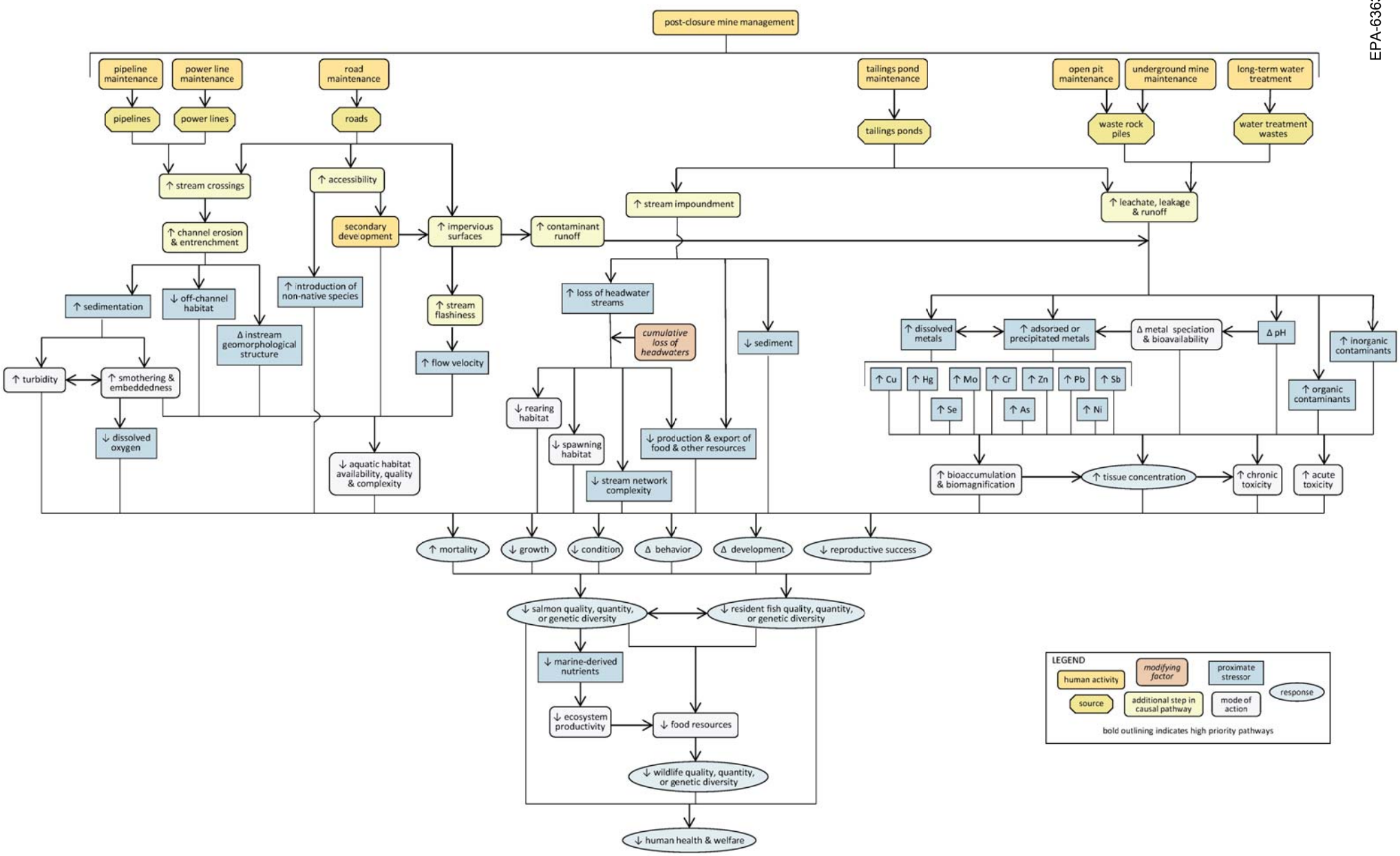

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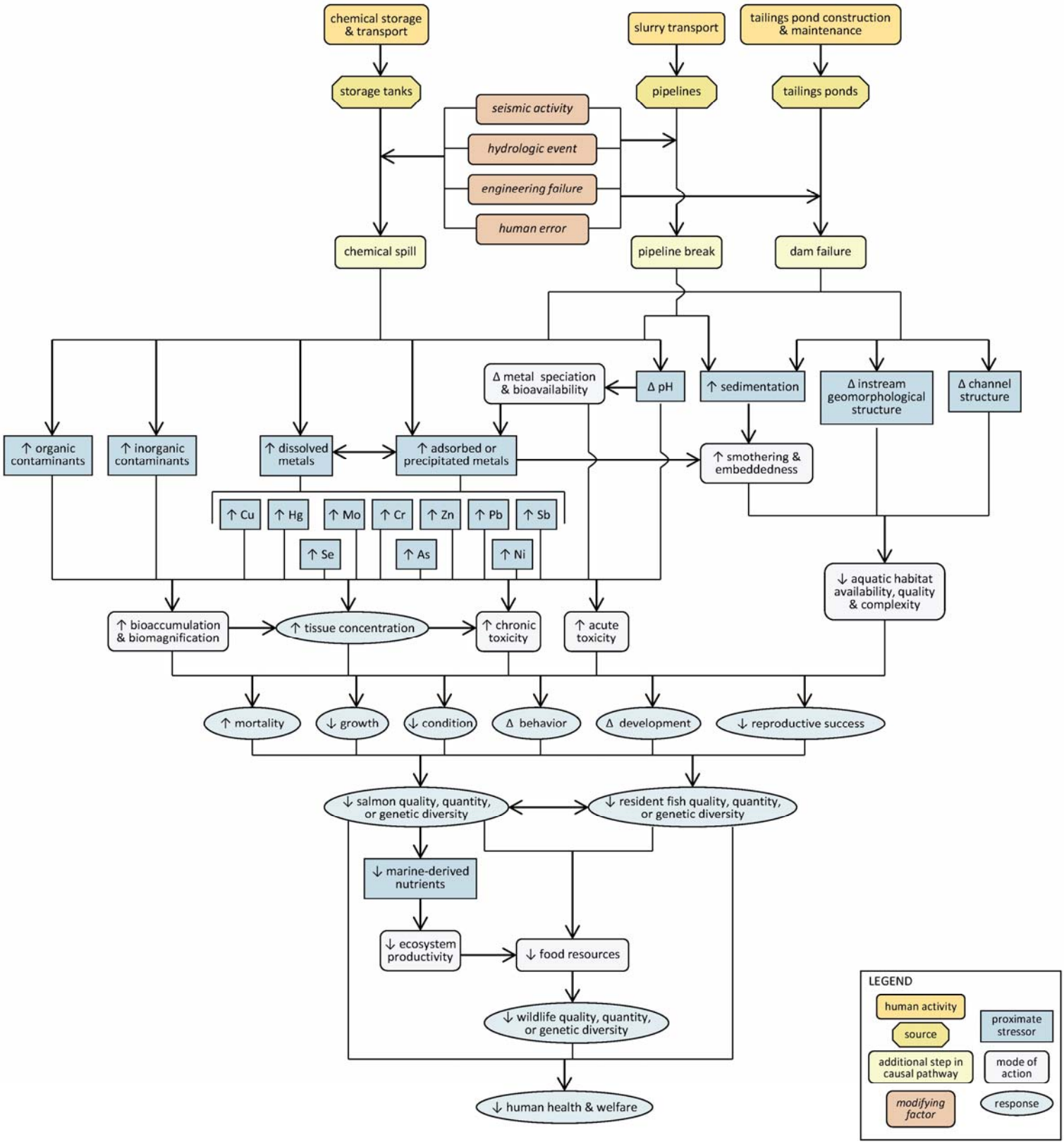
chemical storage & transport
slurry transport
tailings pond construction & maintenance
storage tanks
pipelines
tailings ponds
seismic activity
hydrologic event
engineering failure
human error
chemical spill
pipeline break
dam failure
Δ metal speciation & bioavailability
Δ pH
↑ sedimentation
Δ instream geomorphological structure
Δ channel structure
↑ organic contaminants
↑ inorganic contaminants
↑ dissolved metals
↑ adsorbed or precipitated metals
↑ smothering & embeddedness
↑ Cu
↑ Hg
↑ Mo
↑ Cr
↑ Zn
↑ Pb
↑ Sb
↑ Se
↑ As
↑ Ni
↓ aquatic habitat availability, quality & complexity
↑ bioaccumulation & biomagnification
↑ tissue concentration
↑ chronic toxicity
↑ acute toxicity
↑ mortality
↓ growth
↓ condition
Δ behavior
Δ development
↓ reproductive success
↓ salmon quality, quantity, or genetic diversity
↓ resident fish quality, quantity, or genetic diversity
↓ marine-derived nutrients
↓ ecosystem productivity
↓ food resources
↓ wildlife quality, quantity, or genetic diversity
↓ human health & welfare
LEGEND
human activity
source
proximate stressor
additional step in causal pathway
mode of action
modifying factor
response