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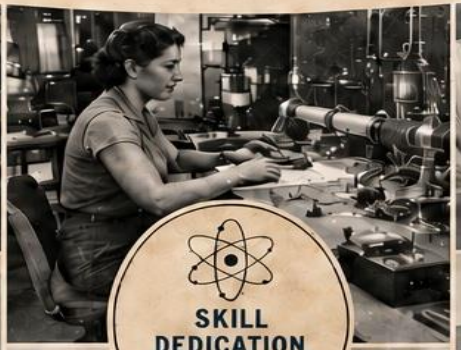

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We remember.
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TOGETHER, THEY BUILT MORE THAN FACILITIES—THEY BUILT A LEGACY.
WE REMEMBER. WE HONOR. WE THANK THEM ALL.

Can Occupational Radiation Doses Be Reconstructed with Sufficient Accuracy? **An Evidence-Based Scientific Evaluation of SEC-00256 at the Pinellas Plant**

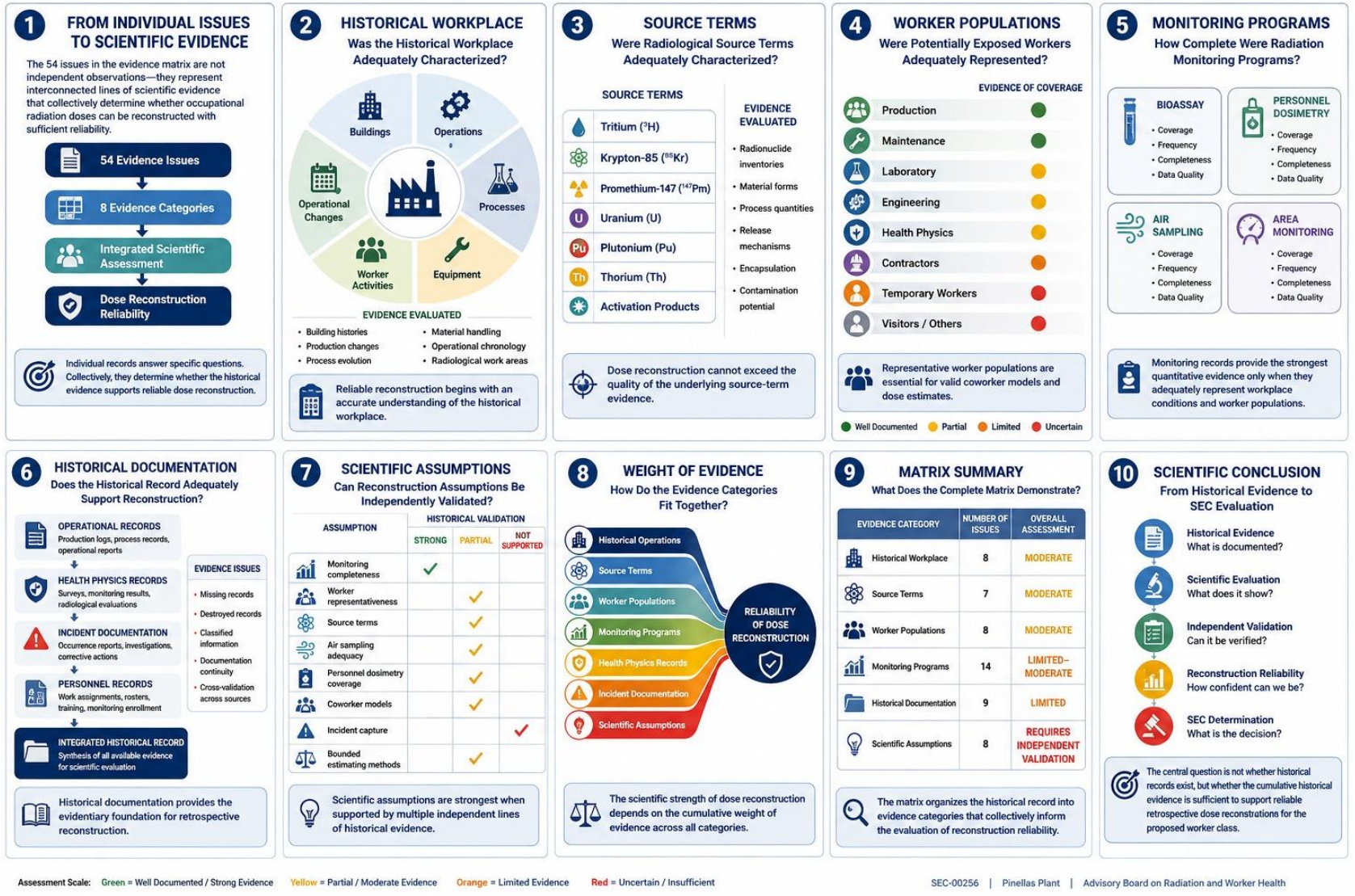
This presentation examines whether the historical evidence available for the proposed worker class supports occupational dose reconstruction with sufficient scientific confidence under the Special Exposure Cohort framework.

What Scientific Question Is the Board Being Asked to Answer?

Scientific Question: Can occupational radiation doses for the proposed worker class be reconstructed with sufficient accuracy?

Scientific Finding: The Board's task is to determine whether occupational radiation doses can be reconstructed with sufficient scientific confidence for the proposed worker class.

Scientific Evaluation Framework

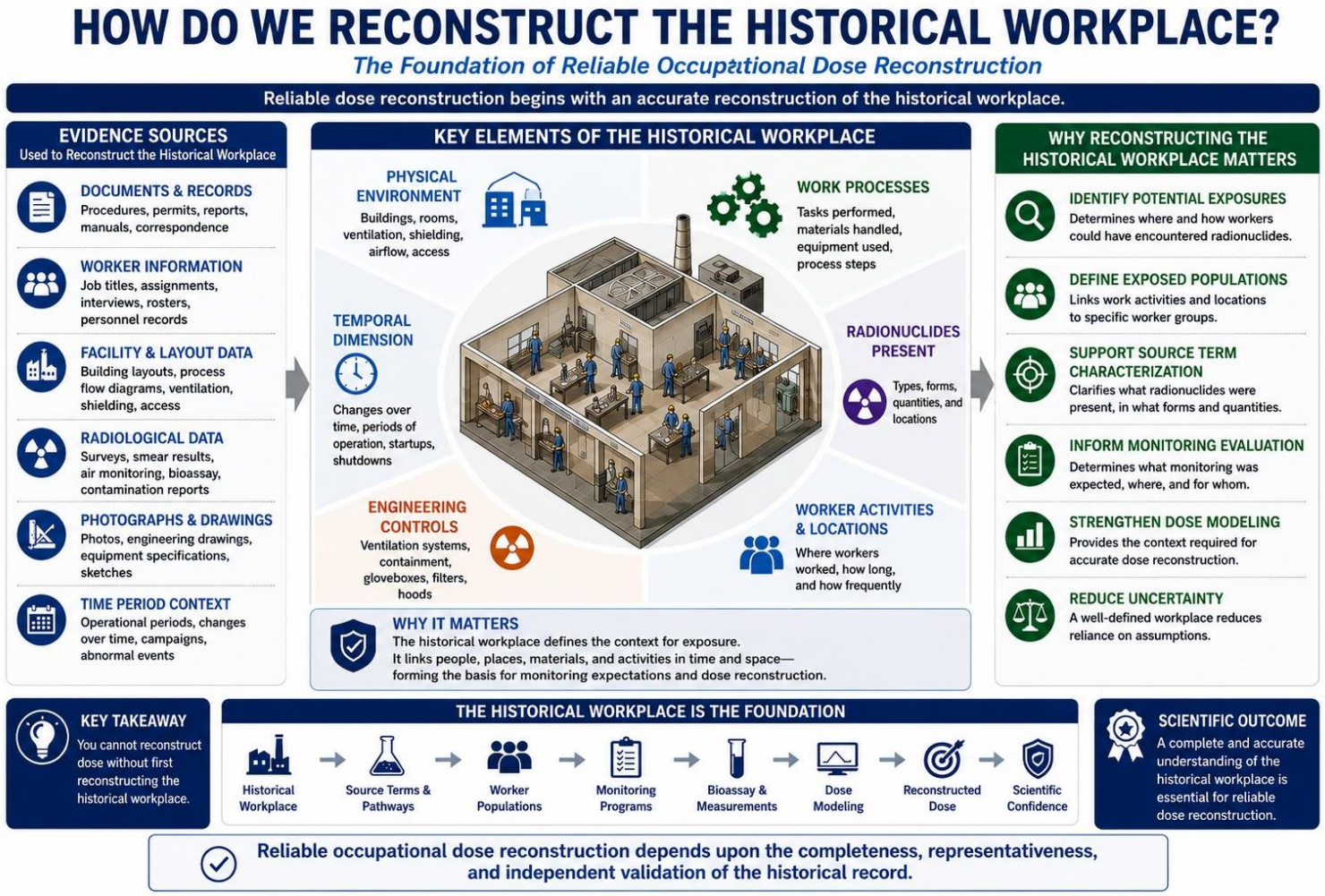


Scientific Question: Why should the evidence be evaluated collectively rather than issue by issue?

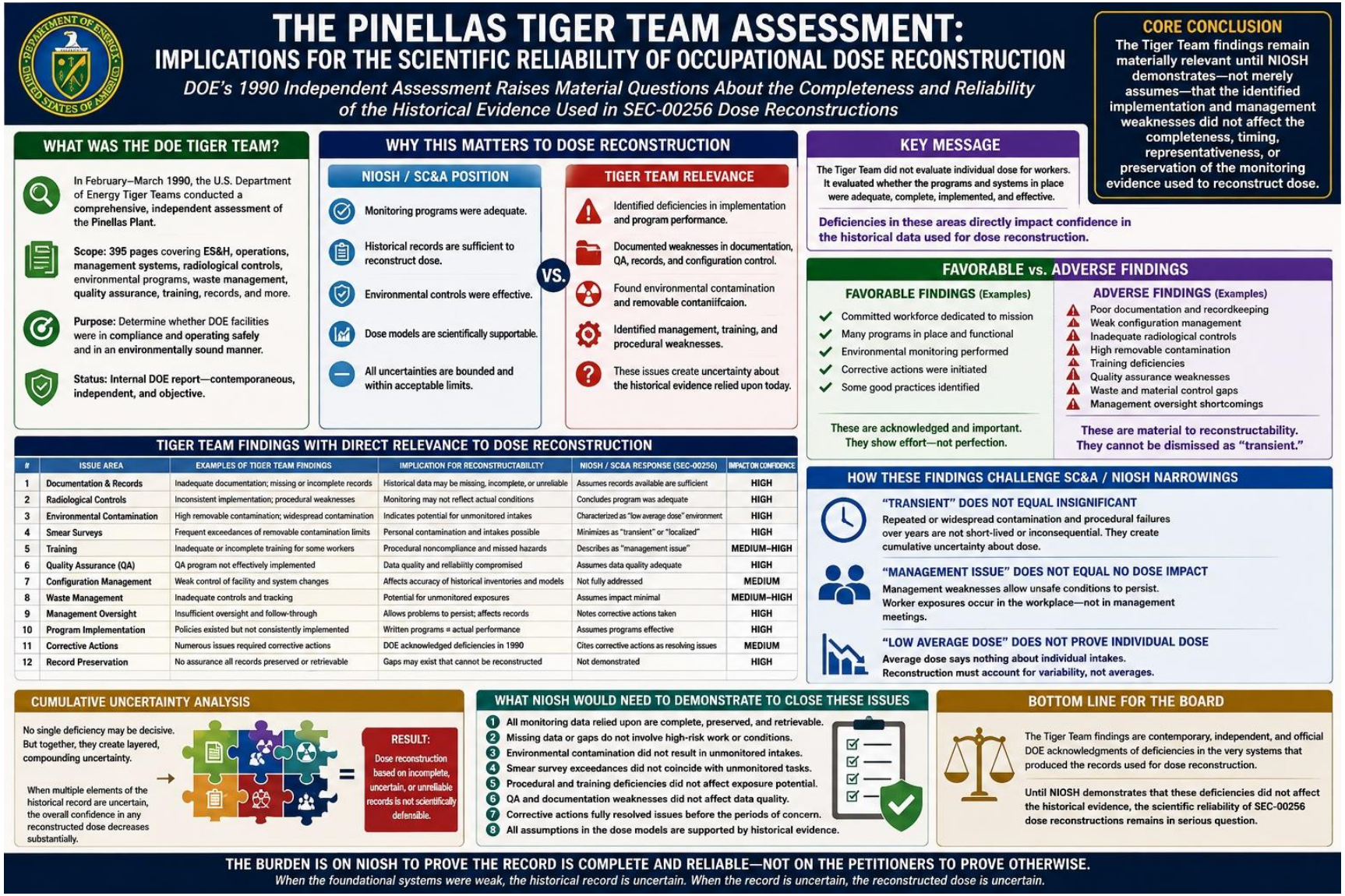
Scientific Finding: The reconstructability standard determines what historical evidence is necessary to support reliable dose estimates.

Scientific Question: Does the exceptional complexity of the Pinellas Plant require a higher standard of historical evidence before occupational radiation doses can be reconstructed with scientific confidence?

Scientific Finding: Yes. Increasing workplace complexity increases uncertainty in retrospective dose reconstruction. Scientific confidence therefore depends on historical evidence that is complete, representative, reliable, and independently validated across operations, radionuclides, worker populations, monitoring programs, and exposure pathways.



Scientific Question: What defines the historical workplace relevant to dose reconstruction?
Scientific Finding: Reliable dose reconstruction begins with an accurate reconstruction of the historical workplace



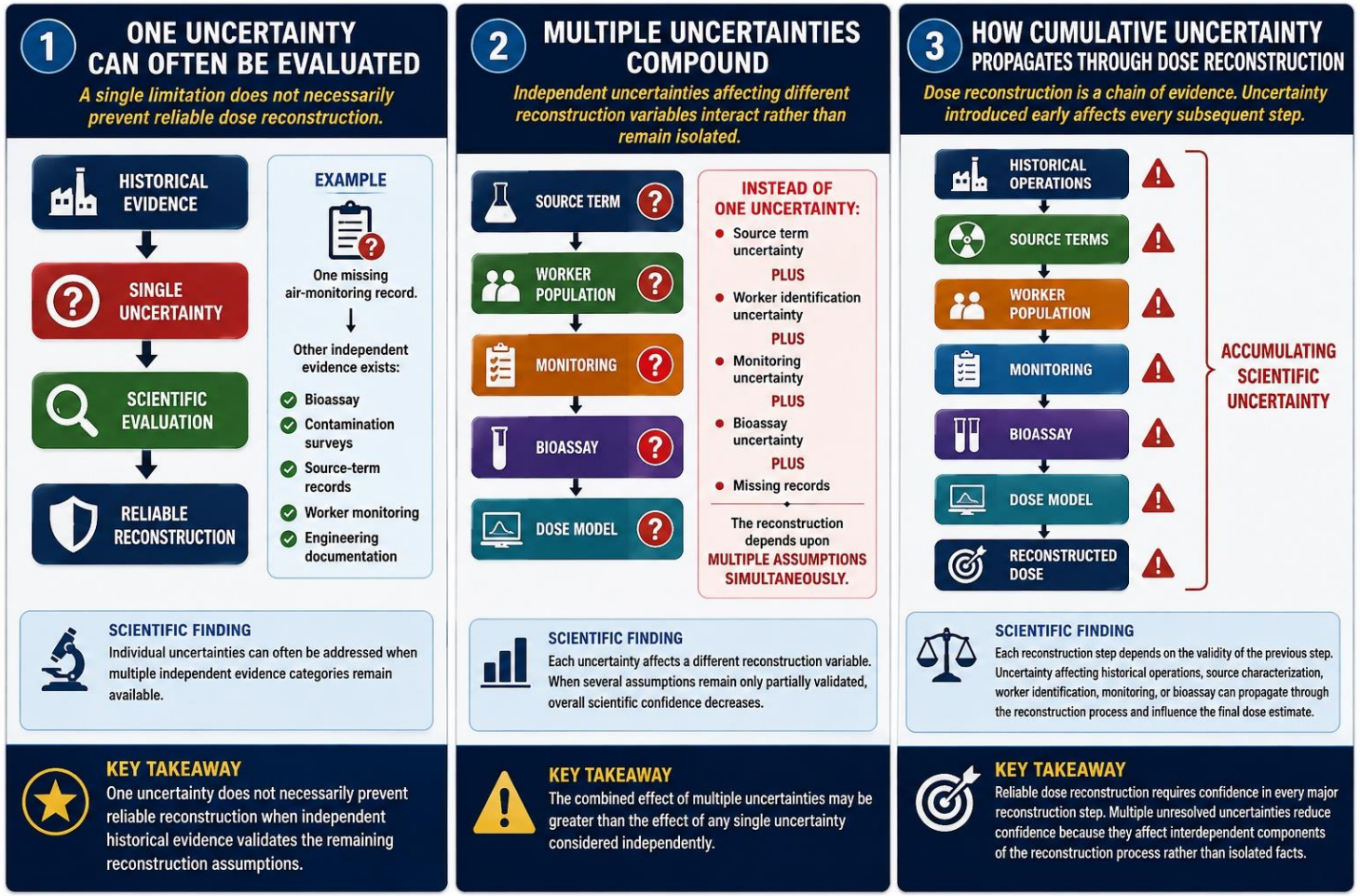
Scientific Question: Can the reconstruction assumptions be independently validated?
Scientific Finding: Independent historical records provide an essential means of validating reconstruction assumptions.

Scientific Question: Can the historical evidence supporting occupational dose reconstruction be independently validated?
Scientific Finding: Independent validation is a fundamental component of scientific confidence. Reconstruction assumptions are strengthened when they are corroborated by multiple, independent historical evidence sources. Where independent validation is limited by incomplete, unavailable, or classified records, scientific confidence depends upon whether the remaining historical evidence is sufficient to support reliable occupational dose reconstruction.

Evidence Integration Framework

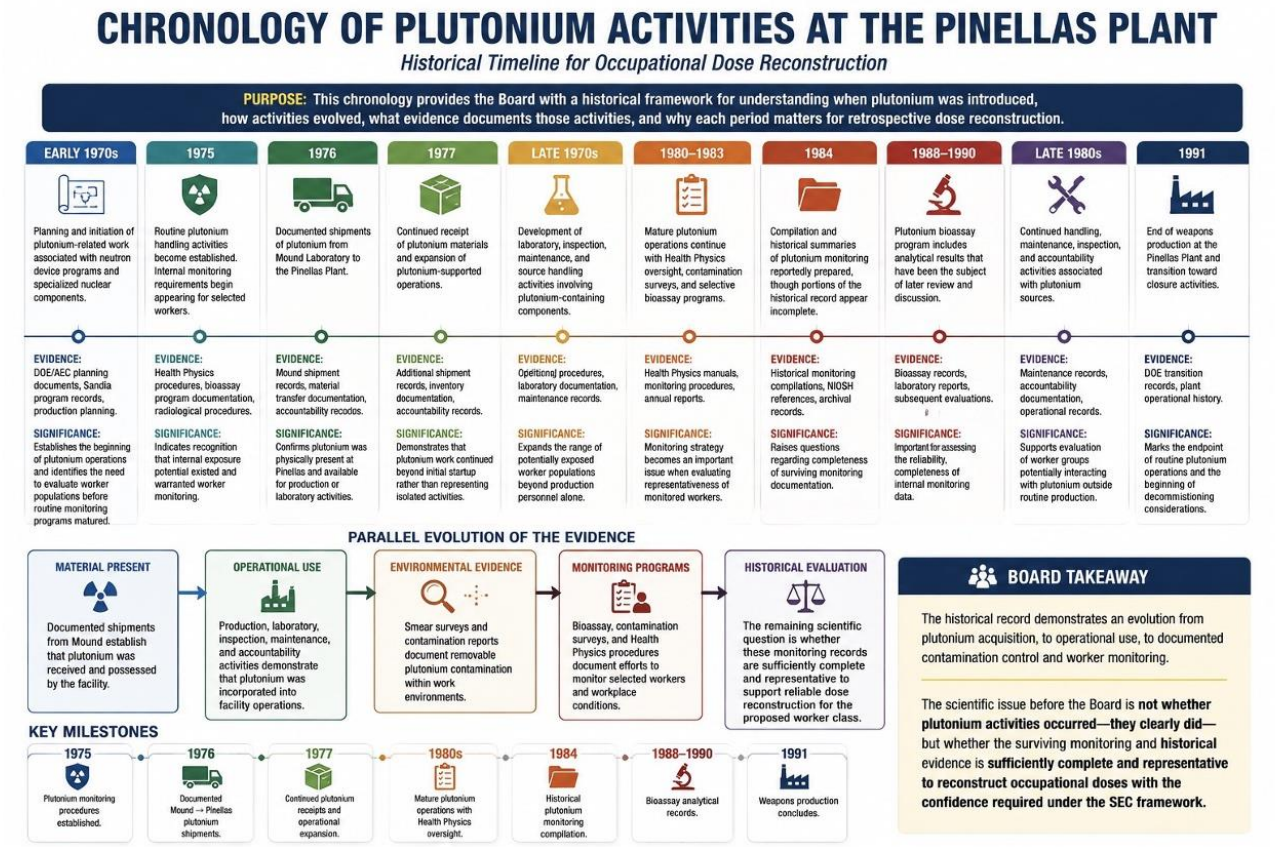
Scientific Question: What evidence categories must work together to support reliable reconstruction?
Scientific Finding: No single evidence category can establish reconstructability; confidence depends on the integration of the complete evidentiary record.

Evaluating the Scientific Impact of Cumulative Uncertainty:



Scientific Question: Should reconstruction uncertainties be evaluated individually or as an interconnected system?
Scientific Finding: Dose reconstruction depends on an interconnected evidentiary chain; scientific confidence is determined by the cumulative effect of uncertainty across that chain.

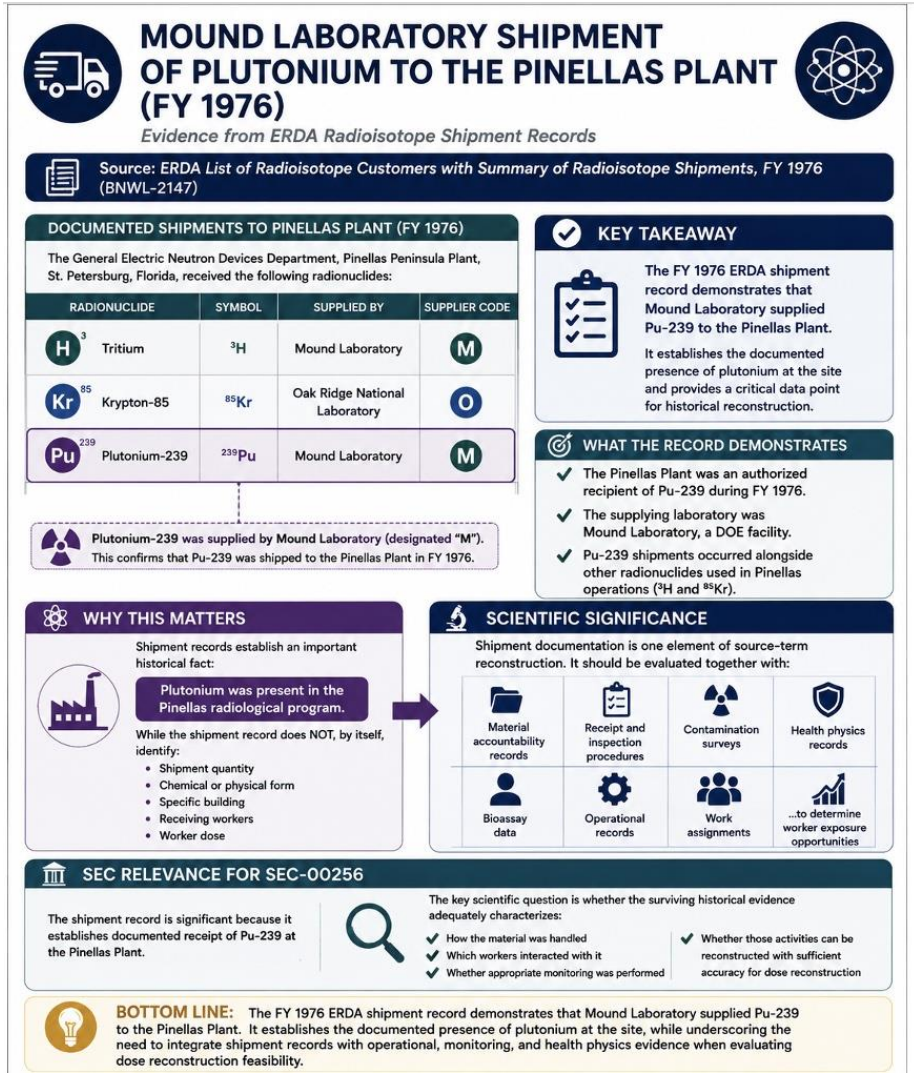
Chronology of Plutonium Activities



Scientific Question: How did plutonium operations evolve over time?

Scientific Finding: The chronology of plutonium operations establishes the temporal framework needed to evaluate potential exposure opportunities.

Mound Shipments



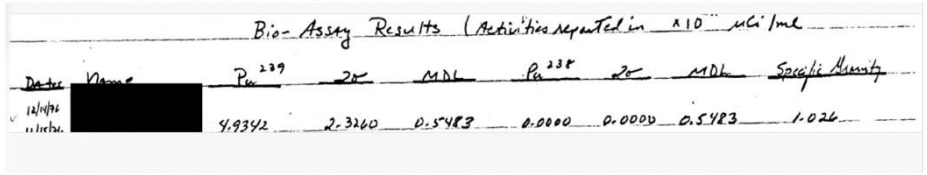
Scientific Question: What documentary evidence establishes plutonium transfers to Pinellas?
Scientific Finding: Shipment records document the introduction and movement of plutonium materials into the Pinellas Plant.

Plutonium Evidence at Pinellas Plant

Scientific Question: Does the historical evidence support reliable reconstruction of potential plutonium exposures at the Pinellas Plant?

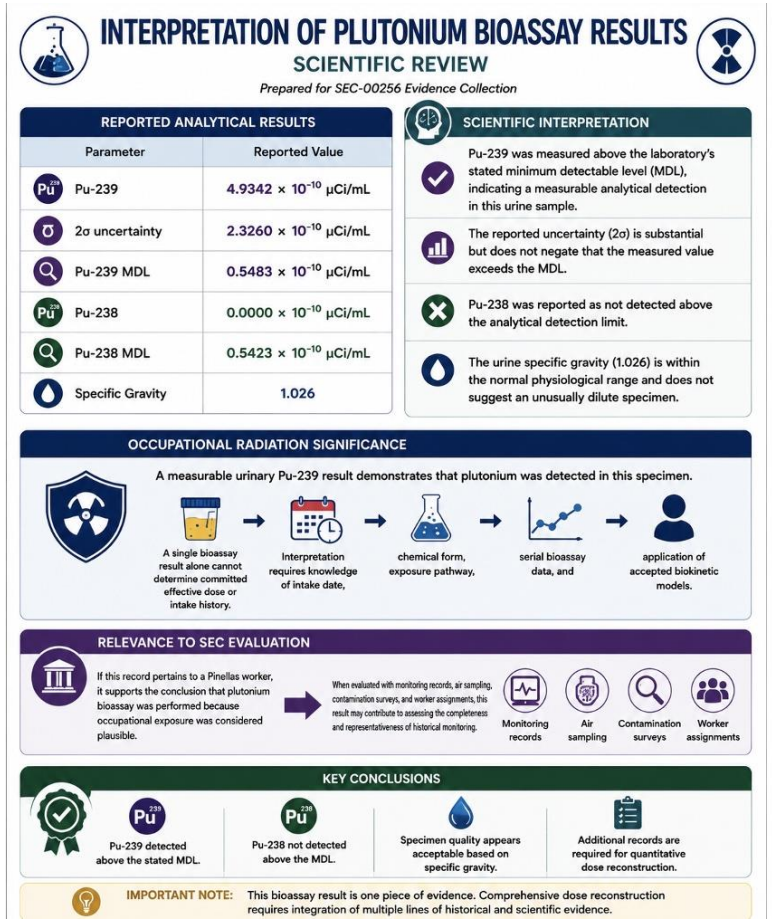
Scientific Finding: Reliable reconstruction of plutonium dose requires independently validated evidence describing source terms, worker exposure opportunities, monitoring, and bioassay over the relevant operational period.

Evidence from Plutonium Bioassay


Bio-Assay Results (Activities reported in ×10⁻¹⁰ uCi/ml

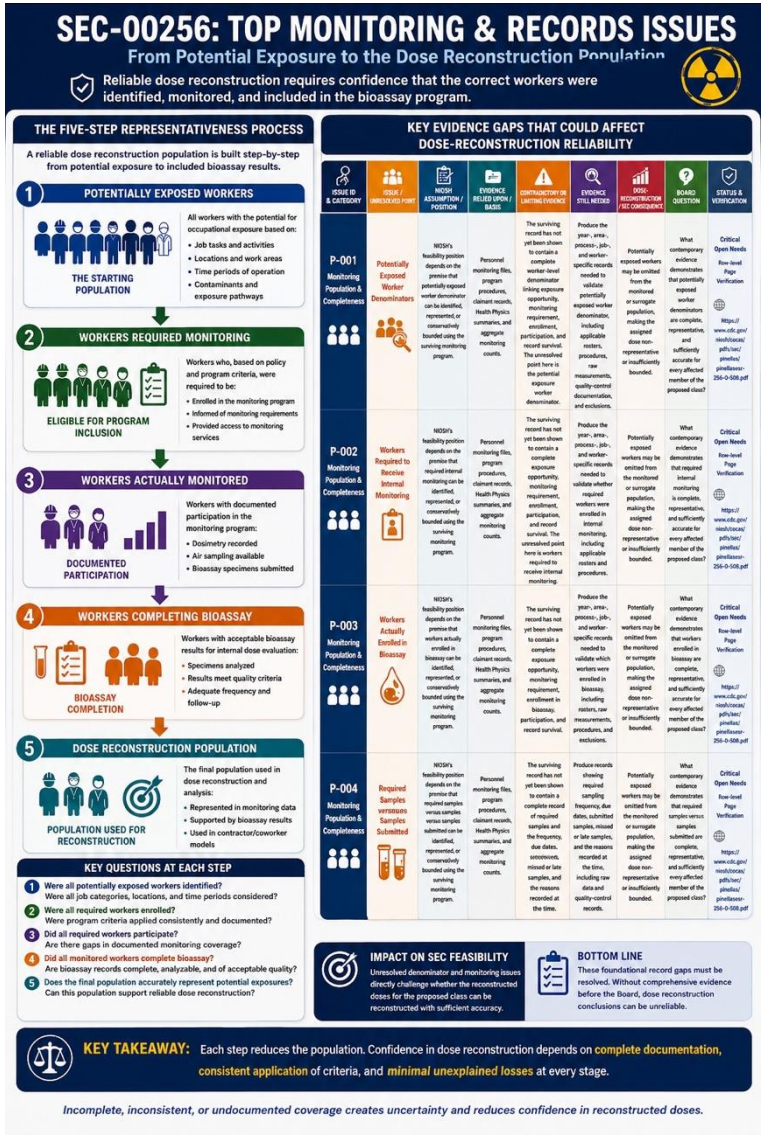
Date	Name	Pu^{239}	2σ	MDL	Pu^{238}	2σ	MDL	Specific Gravity
12/19/91	[redacted]	4.9342	2.3260	0.5483	0.0000	0.0000	0.5483	1.026

Pu-239: The reported value (**4.9342**) is substantially greater than the listed **MDL (0.5743)**. Therefore, **it is above the laboratory's minimum detectable level** and therefore represents measurable analytical evidence that should be interpreted alongside operational records, monitoring data, and other historical evidence.



Scientific Question: What evidence do the plutonium bioassay records provide?

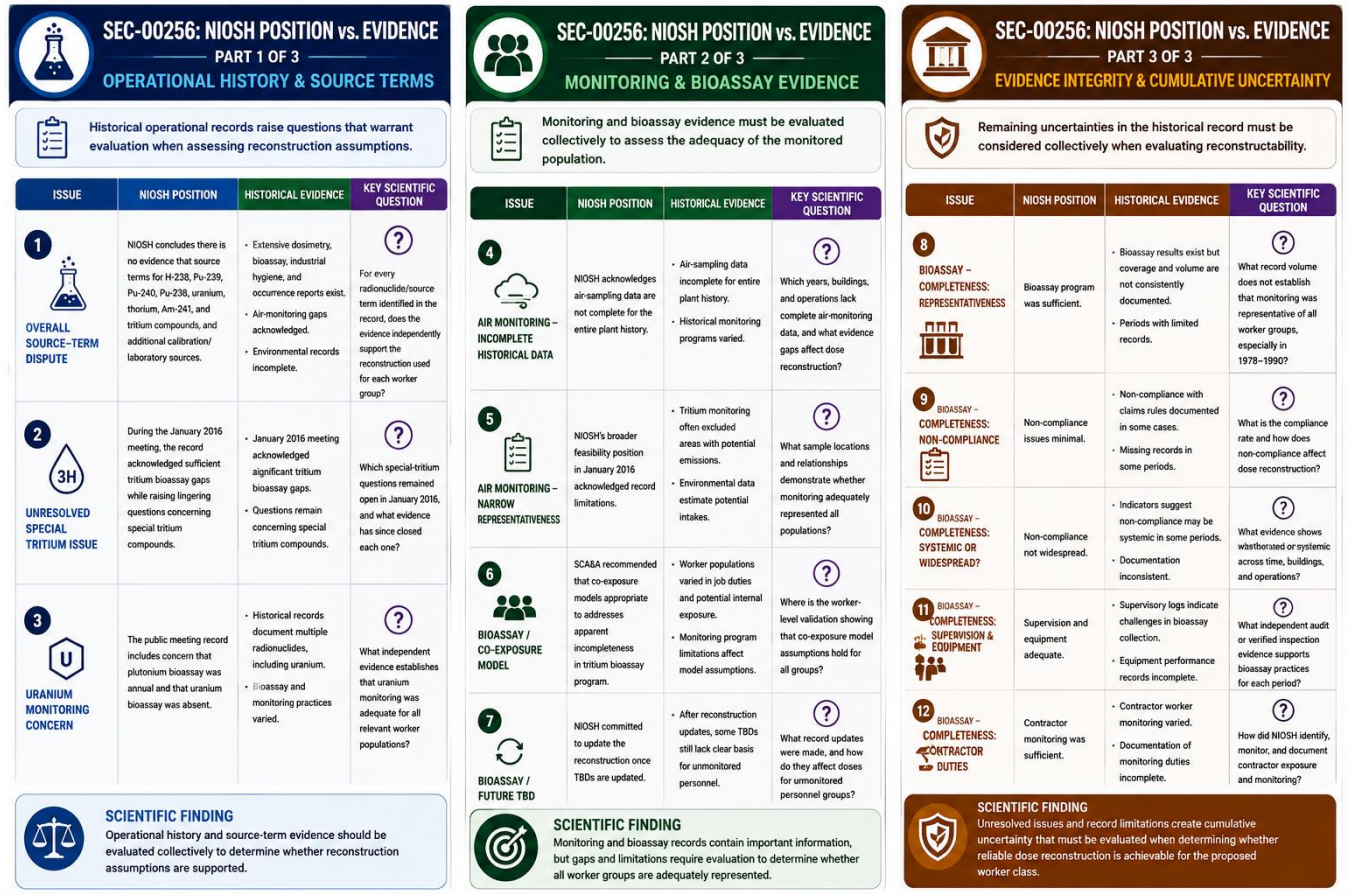
Scientific Finding: Bioassay records provide an independent line of evidence relevant to evaluating internal exposure.



Scientific Question: Does the historical record demonstrate that the population used for dose reconstruction accurately represents all workers with potential occupational radiation exposure?

Scientific Finding: Reliable occupational dose reconstruction depends on a documented and verifiable progression from potentially exposed workers to the final dose reconstruction population.

Testing Reconstruction Assumptions Against the Historical Record



SEC-00256: NIOSH POSITION vs. EVIDENCE
PART 1 OF 3
OPERATIONAL HISTORY & SOURCE TERMS

Historical operational records raise questions that warrant evaluation when assessing reconstruction assumptions.

ISSUE	NIOSH POSITION	HISTORICAL EVIDENCE	KEY SCIENTIFIC QUESTION
1 OVERALL SOURCE-TERM DISPUTE	NIOSH concludes there is no evidence that source terms for H-238, Pu-239, Pu-240, Pu-238, uranium, thorium, Am-241, and tritium compounds, and additional calibration/ laboratory sources.	• Extensive dosimetry, bioassay, industrial hygiene, and occurrence reports exist. • Air-monitoring gaps acknowledged. • Environmental records incomplete.	For every radionuclide/source term identified in the record, does the evidence independently support the reconstruction used for each worker group?
2 UNRESOLVED SPECIAL TRITIUM ISSUE	During the January 2016 meeting, the record acknowledged sufficient tritium bioassay gaps while raising lingering questions concerning special tritium compounds.	• January 2016 meeting acknowledged aignificant tritium bioassay gaps. • Questions remain concerning special tritium compounds.	Which special-tritium questions remained open in January 2016, and what evidence has since closed each one?
3 URANIUM MONITORING CONCERN	The public meeting record includes concern that plutonium bioassay was annual and that uranium bioassay was absent.	• Historical records document multiple radionuclides, including uranium. • Bioassay and monitoring practices varied.	What independent evidence establishes that uranium monitoring was adequate for all relevant worker populations?

SCIENTIFIC FINDING
Operational history and source-term evidence should be evaluated collectively to determine whether reconstruction assumptions are supported.

SEC-00256: NIOSH POSITION vs. EVIDENCE
PART 2 OF 3
MONITORING & BIOASSAY EVIDENCE

Monitoring and bioassay evidence must be evaluated collectively to assess the adequacy of the monitored population.

ISSUE	NIOSH POSITION	HISTORICAL EVIDENCE	KEY SCIENTIFIC QUESTION
4 AIR MONITORING – INCOMPLETE HISTORICAL DATA	NIOSH acknowledges air-sampling data are not complete for the entire plant history.	• Air-sampling data incomplete for entire plant history. • Historical monitoring programs varied.	Which years, buildings, and operations lack complete air-monitoring data, and what evidence gaps affect dose reconstruction?
5 AIR MONITORING – NARROW REPRESENTATIVENESS	NIOSH's broader feasibility position in January 2016 acknowledged record limitations.	• Tritium monitoring often excluded areas with potential emissions. • Environmental data estimate potential intakes.	What sample locations and relationships demonstrate whether monitoring adequately represented all populations?
6 BIOASSAY / CO-EXPOSURE MODEL	SC&A recommended that co-exposure models appropriate to addresses apparent incompleteness in tritium bioassay program.	• Worker populations varied in job duties and potential internal exposure. • Monitoring program limitations affect model assumptions.	Where is the worker-level validation showing that co-exposure model assumptions hold for all groups?
7 BIOASSAY / FUTURE TBD	NIOSH committed to update the reconstruction once TBDs are updated.	• After reconstruction updates, some TBDs still lack clear basis for unmonitored personnel.	What record updates were made, and how do they affect doses for umonitored personnel groups?

SCIENTIFIC FINDING
Monitoring and bioassay records contain important information, but gaps and limitations require evaluation to determine whether all worker groups are adequately represented.

SEC-00256: NIOSH POSITION vs. EVIDENCE
PART 3 OF 3
EVIDENCE INTEGRITY & CUMULATIVE UNCERTAINTY

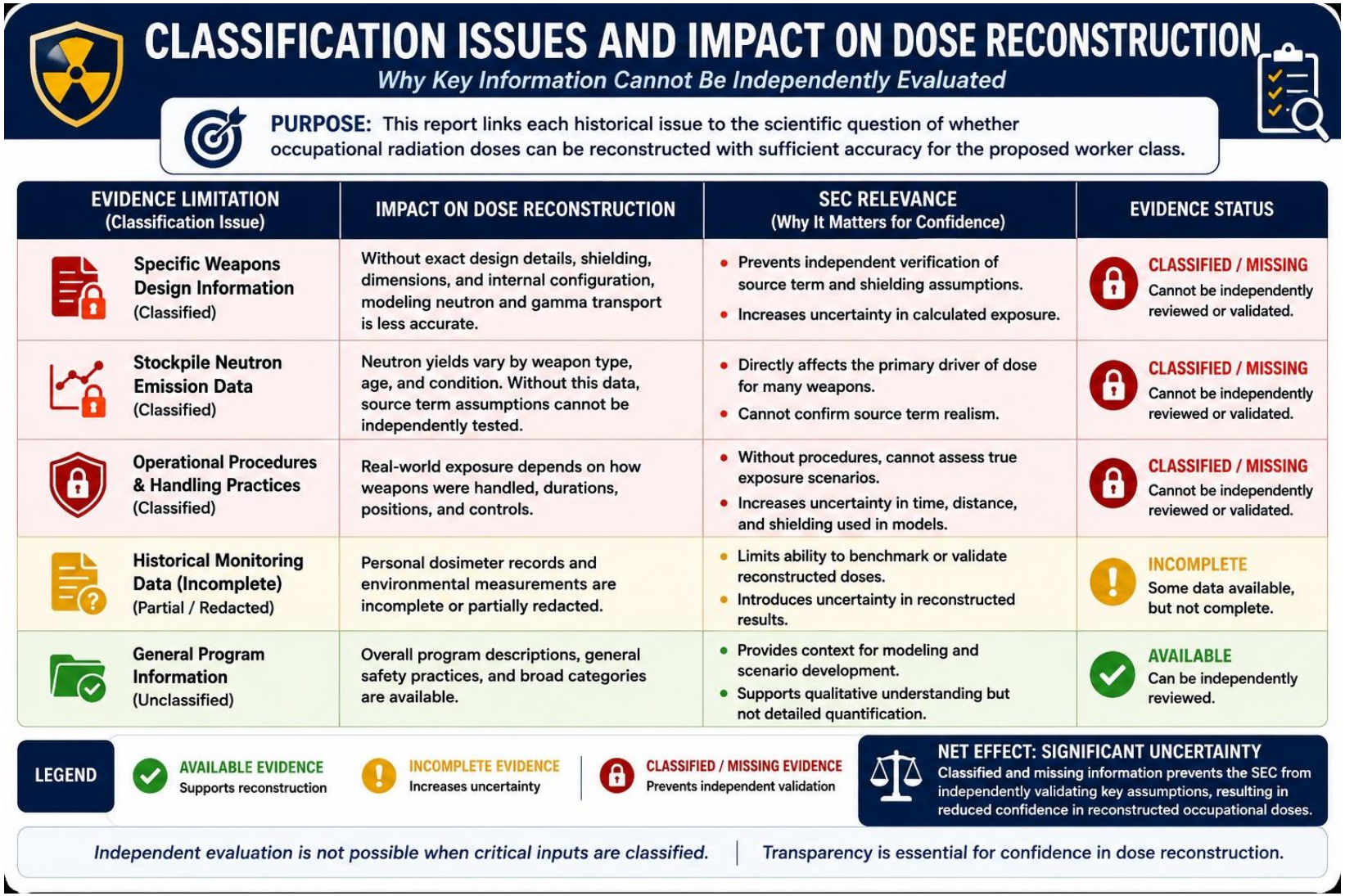
Remaining uncertainties in the historical record must be considered collectively when evaluating reconstructability.

ISSUE	NIOSH POSITION	HISTORICAL EVIDENCE	KEY SCIENTIFIC QUESTION
8 BIOASSAY – COMPLETENESS: REPRESENTATIVENESS	Bioassay program was sufficient.	• Bioassay results exist but coverage and volume are not consistently documented. • Periods with limited records.	What record volume does not establish that monitoring was representative of all worker groups, especially in 1978–1990?
9 BIOASSAY – COMPLETENESS: NON-COMPLIANCE	Non-compliance issues minimal.	• Non-compliance with claims rules documented in some cases. • Missing records in some periods.	What is the compliance rate and how does non-compliance affect dose reconstruction?
10 BIOASSAY – COMPLETENESS: SYSTEMIC OR WIDESPREAD?	Non-compliance not widespread.	• Indicators suggest non-compliance may be systemic in some periods. • Documentation inconsistent.	What evidence shows whetherated or systemic across time, buildings, and operations?
11 BIOASSAY – COMPLETENESS: SUPERVISION & EQUIPMENT	Supervision and equipment adequate.	• Supervisory logs indicate challenges in bioassay collection. • Equipment performance records incomplete.	What independent audit or verified inspection evidence supports bioassay practices for each period?
12 BIOASSAY – COMPLETENESS: CONTRACTOR DUTIES	Contractor monitoring was sufficient.	• Contractor worker monitoring varied. • Documentation of monitoring duties incomplete.	How did NIOSH identify, monitor, and document contractor exposure and monitoring?

SCIENTIFIC FINDING
Unresolved issues and record limitations create cumulative uncertainty that must be evaluated when determining whether reliable dose reconstruction is achievable for the proposed worker class.

Scientific Question: To what extent does the historical record independently validate the assumptions used to reconstruct occupational radiation dose?

Scientific Finding: Historical evidence both supports and challenges key reconstruction assumptions; remaining uncertainties should be evaluated collectively when assessing reconstructability.

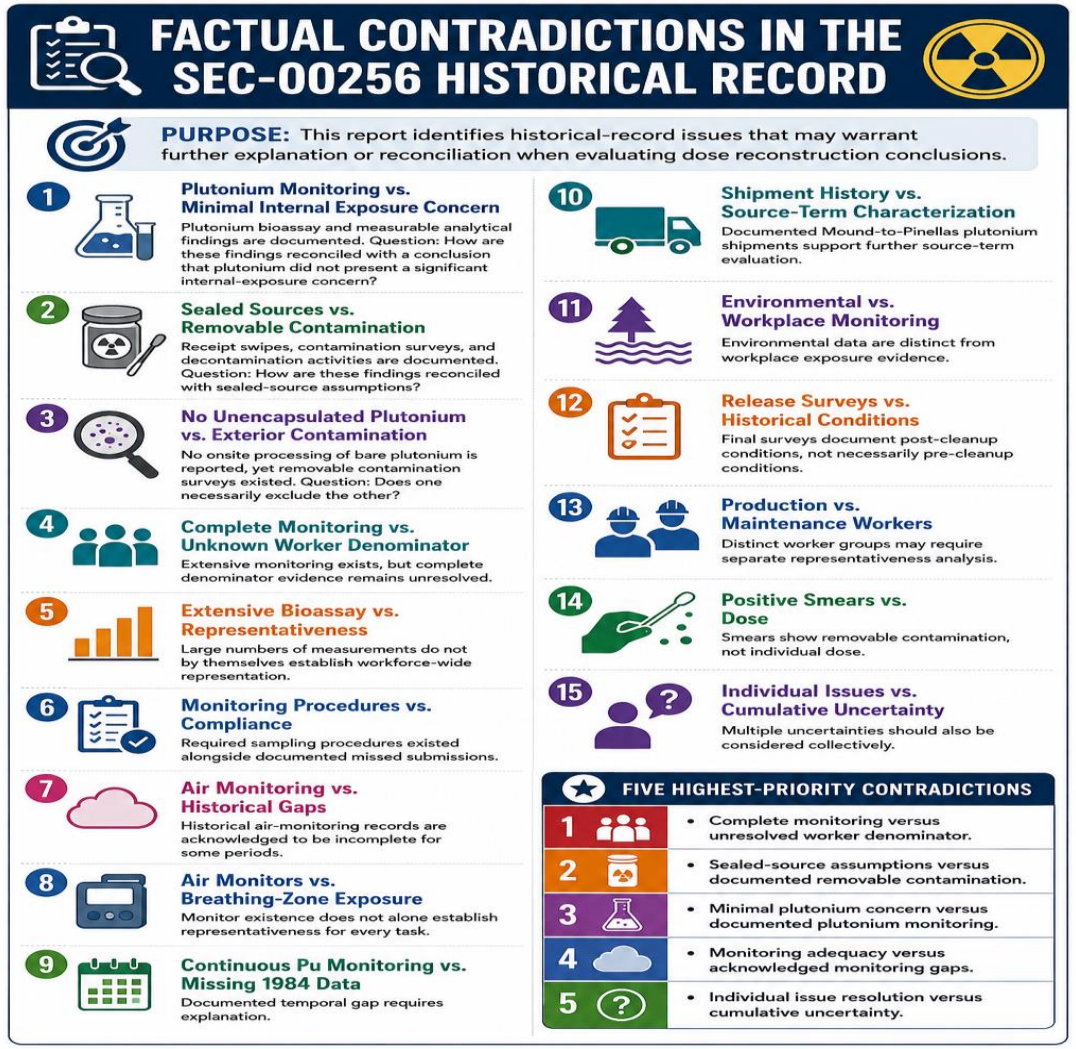


Scientific Question: Can dose reconstruction be independently validated when key historical information remains classified or unavailable?
Scientific Finding: When classified information limits independent validation of critical reconstruction assumptions, confidence depends on whether the remaining historical evidence is sufficiently complete, representative, reliable, and independently corroborated. It does not mean: "We found no public documentation, so there is no evidentiary gap" as has been argued by NIOSH. The absence of publicly available documentation does not demonstrate the absence of relevant historical evidence

Five Critical Contradictions
Historical Evidence Requiring Scientific Reconciliation

Scientific Question: Where does the historical record challenge the reconstruction assumptions?
Scientific Finding: Monitoring alone is not sufficient. Reliable dose reconstruction requires integration of all relevant historical evidence.

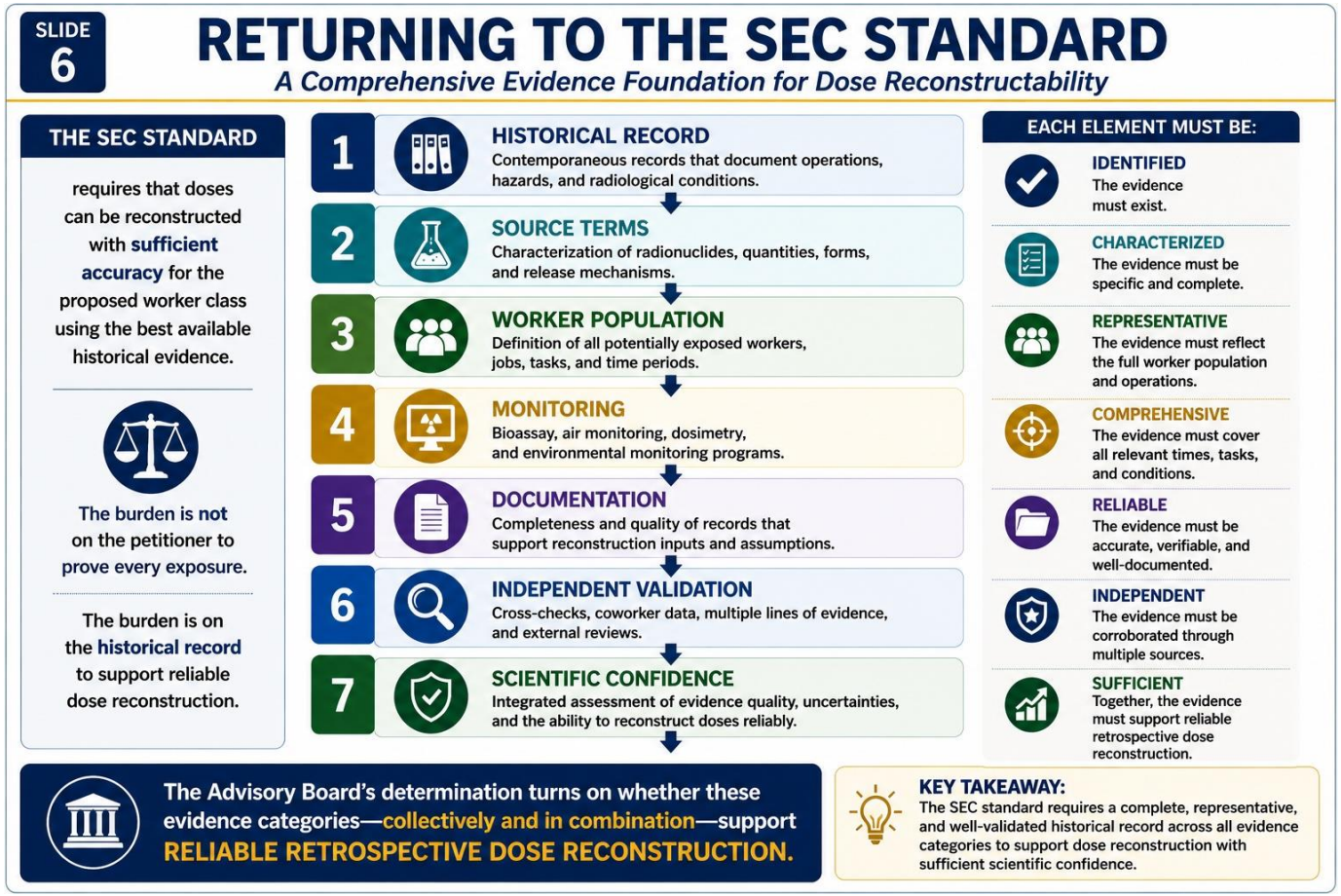
What Factual Contradictions Require Reconciliation in SEC-00256?



Scientific Question: Have all material historical contradictions been reconciled before concluding that dose reconstruction is reliable?

Scientific Finding: The evidence identifies fifteen recurring contradictions—including five high-priority issues— that warrant scientific reconciliation before reaching conclusions regarding reconstructability.

The SEC Standard for Reliable Dose Reconstruction



Scientific Question: What historical evidence must be demonstrated before occupational radiation doses can be reconstructed with sufficient scientific confidence under the SEC standard?

Scientific Finding: The SEC standard is satisfied only when the collective historical evidence provides sufficient scientific confidence that occupational radiation doses can be reconstructed for the proposed worker class.

Board Determination

- The Board's responsibility is to determine whether the historical evidence satisfies the scientific standard for reliable occupational dose reconstruction. Throughout this presentation, I have evaluated the available historical evidence against the scientific standard required for reconstructability.
- The question before the Board is whether that evidence provides sufficient scientific confidence to reconstruct occupational radiation doses for the proposed worker class.
- Scientific confidence is established through the collective weight of independently validated historical evidence.
- I respectfully leave that scientific determination to the Board.

This presentation as well as other relevant materials will be available online at:

Energy Employees Claimant Assistance Project

https://eecap.org/advocates/pinellas