

1 alignment/sam-to-sopeec.md

1.1 SAM → SOPEEC semantic mapping (topic level)

1.1.1 1. Preamble

- **1.1 Scope**
 - SOPEEC: General introduction and “Body of Knowledge” objective — both frame the exam/operator role.
 - *Semantic match (contextual framing, not examinable content).*
 - **1.2 Licensing Requirements**
 - SOPEEC 1.0(h–i): Operator Certification, Log Book.
 - *Semantic match (jurisdictional licensing vs exam certification).*
 - **1.3 Hands-on Experience**
 - SOPEEC 1.7 (Operation), 1.2 (Safety), 1.11 (Emergency Procedures).
 - *Semantic match: SAM lists concrete tasks; SOPEEC lists the knowledge and safety outcomes those tasks support.*
 - **1.4 Cautions and Competence**
 - SOPEEC 1.2 Safety, 1.11 Emergency Procedures.
 - *Semantic match (emphasis on competence and risk awareness).*
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1.1.2 2. Course Outline

1.1.2.1 2.1 Parts of a Steam Traction Engine

- SOPEEC 1.10(c) Engine components; 1.5(f–h) boiler parts and auxiliaries.
- *Semantic match (component identification and terminology).*

1.1.2.2 2.2 Properties of Water and Steam

- SOPEEC 1.4 Thermodynamics; 1.9 Water Treatment (foaming, priming).
- *Strong semantic match (phases, latent heat, wet/dry/superheated steam, pressure–temperature relations).*

1.1.2.3 2.3 Boiler Design and Construction

- **2.3.1 Types of Boilers**
 - SOPEEC 1.5(a–d) — firetube, watertube, locomotive, vertical.
 - *Direct match.*
- **2.3.2 Five safety features on a boiler**
 - Water gauge glass, try cocks, steam pressure gauge, safety valves, fusible plug.
 - SOPEEC 1.5(h), 1.7(a), 1.2(e–g, j).
 - *Strong semantic match (same devices, similar safety focus).*
- **2.3.3 Boiler Construction**
 - Firebox, barrel, smoke box, tube sheets, seams, riveted vs welded, stays, hand holes, smoke box components.
 - SOPEEC 1.5(f–g, i–n, q), 1.6(j–l).
 - *Strong semantic match; SAM is more detailed.*

1.1.2.4 2.4 Items attached to the boiler

- **2.4.1 Safety features**

- Cross-references 2.3.2; same mapping as above.

- **2.4.2 Boiler features**

- Injectors, feedwater pumps, top checks, dome valve, blower, blowdown valve, whistle, hand holes, ash pan, grates, dampers.
- SOPEEC 1.5(h) (auxiliary components), 1.7(d, n, t, v), 1.9(o).
- *Semantic match; SAM provides operational detail.*

1.1.2.5 2.5 Piping, Fittings and Valves

- **2.5.1 Pipe**

- Types, schedules, code requirements.
- SOPEEC 1.5(m), 1.5(n) (piping and fittings), 1.5(o) (valves).
- *Semantic match; SAM adds specific schedule and material recommendations.*

- **2.5.2 Fittings**

- Elbows, nipples, reducers, unions, NPT, steam service class.
- SOPEEC 1.5(n) pipe fittings.
- *Direct semantic match.*

- **2.5.3 Valves**

- Globe, gate, ball, check valves, steam rating, documentation.
- SOPEEC 1.5(o) valves: types, construction, application.
- *Direct semantic match.*

1.1.2.6 2.6 Boiler Water Treatment

- Purpose, oxygen, minerals, pH, foaming, priming, blowdown, test kits, record keeping.
- SOPEEC 1.9(a-n).
- *Strong semantic match; SAM and SOPEEC cover essentially the same conceptual ground.*

1.1.2.7 2.7 Engines

- **2.7.1 Types of Steam Engines**

- Simple, compound, tandem, cross.
- SOPEEC 1.10(a-b).
- *Direct match.*

- **2.7.2 Determining Power Output**

- Horsepower, drawbar HP, torque, Prony brake, dynamometer.
- SOPEEC 1.3(b) engine horsepower.
- *Semantic match; SAM more detailed on methods.*

- **2.7.3 Typical Components of Traction Engines**

- Extensive list of engine parts and controls.
- SOPEEC 1.10(c, f, h-l).
- *Strong semantic match; SAM is more granular.*

- **2.7.4 Controlling Motion and Power**

- Throttle, governor, valve cycle, valve gear, dead centres, hooking up.
- SOPEEC 1.7(h, j, k), 1.10(d-e, h-l).
- *Strong semantic match.*

1.1.2.8 2.8 Startup Routine Procedures

• 2.8.1 Crew Preparation For a New Engine

- Crown sheet marking, try cock verification.
- SOPEEC 1.7(b, g), 1.2(a-b).
- *Semantic match (water level safety and startup).*

• 2.8.2 Crew Preparation For the Day's Operation

- Tools, water checks, hand hole checks, valve setting, cleaning, hot ashes.
- SOPEEC 1.7(b-f, g, n), 1.2(a-r).
- *Semantic match; SAM is more procedural.*

1.1.2.9 2.9 Lubrication

- Types of lubrication, delivery systems, bearing checks.
- SOPEEC 1.10(f) lubricants; 1.7(j, u) (knocking, condensate).
- *Partial semantic match; SAM more detailed on practice.*

1.1.2.10 2.10 Firing

- Clean grates, gentle firing, fuel types, arches, draft, dampers, banking, back draft.
- SOPEEC 1.7(n) principles of combustion; 1.2(o) fires due to sparks.
- *Strong semantic match; SAM adds practical firing technique.*

1.1.2.11 2.11 Handling an Engine

- Water checks, proving gauge glass, try cocks, cylinder drains, clutch, braking without brakes, steering, belt operation.
- SOPEEC 1.7(o-t), 1.2(d, k, p).
- *Strong semantic match.*

1.1.2.12 2.12 Belting up, Hitching and Maneuvering

- Belting, crew duties, connecting to equipment, maneuvering, parading.
- SOPEEC 1.7(s) powering stationary load; 1.2(p) driving in public demonstration.
- *Semantic match; SAM provides much more operational detail.*

1.1.2.13 2.13 Emergency Procedures

- Isolating boiler, killing fire, specific failure scenarios (glass, runaway, injector, foaming, tube burst, safety valve issues, etc.).
- SOPEEC 1.2(a-l), 1.11(a-h).
- *Strong semantic match.*

1.1.2.14 2.14 Shutdown

- End-of-day shutdown, safe to leave engine, short/long-term lay-up.
- SOPEEC 1.7(c, f), 1.9(o).
- *Semantic match.*

1.1.2.15 2.15 Inspection

- Types of tests, frequency, preparation, MAWP determination.
- SOPEEC 1.6(e-i), 1.8(a-d).
- *Strong semantic match; SOPEEC adds explicit NDE methods.*

1.1.2.16 2.16 Repairs and Modifications

- SAM QA program, repair plans, approval, certification, pre/post inspection.
- SOPEEC 1.12(a-e).
- *Strong semantic match; SOPEEC more explicit about CSA/ASME/NBIC references.*

1.1.2.17 2.17 Log Books

- Personal and engine logbooks.
- SOPEEC 1.0(i), 1.7(l), 1.0(g).
- *Direct semantic match.*

1.1.2.18 2.18 Boiler Law and Regulations

- ASME, NBIC, CSA, Manitoba Act, ITS Manitoba.
- SOPEEC 1.0(a-d), 1.6(h), 1.12(a-c).
- *Strong semantic match.*

1.1.2.19 3. History of Steam Traction Engine Development (optional)

- No explicit counterpart in SOPEEC.
- *SAM-only content.*