Kenai/Cook Inlet
Flow Line Compliance Evaluation

Sam Saengsudham FOR
Timothy Law
Integrity & Engineering Unit
November 2015
1. Compliance Evaluation Program Overview
2. Kenai/Cook Inlet Production Facility & Platform Compliance Reviews
3. Program Achievements
OLD SPAR*
Prevention & Emergency Response Program (PERP) + Industry Preparedness Program (IPP)

NEW SPAR*
Prevention, Preparedness, & Response Program (PPRP)

Gary Folley
PPRP Manager
SOL

Preparedness & Response Section
Graham Wood
ANC

Prevention & Technical Support Section
Sarah Moore
JNU

Interagency Coordination Section
Steve Russell
SOL

* SPAR also includes Contaminated Sites and Response Fund Administration Programs.

- CENTRAL ALASKA REGION
  SOSC: JOHN KOTULA
  Cook Inlet/Kodiak Unit
  Unit Manager: Young Ha

- NORTHERN ALASKA REGION
  SOSC: TOM DERUYTER

- SOUTHEAST ALASKA REGION
  SOSC: BOB MATSON

- UNDERGROUND TANKS (USTs)
  LARRY BRINKERHOFF

- TRAINING & GUIDANCE
  BECKY SPIEGEL

- INTEGRITY & ENGINEERING
  SAM SAENGSUDDHAM

- SCIENTIFIC SUPPORT
  RICK BERHARDT

- PROGRAM SUPPORT
  BILL STEELE

- JPO LIAISON
- DISASTER COORDINATION
- ARRT/UNIFIED PLAN
- USCG/EPA/BSEE
- MOUs/MOAs
- PSBC TASK FORCE
- RCACs
Article 1. Oil Pollution Prevention Requirements.

Section
005. Responsibility
007. General oil pollution prevention requirements
015. Waiver
020. Oil Discharge Prevention Training & Recordkeeping
025. Transfer requirements
027. Requirements for laden tank vessels
037. Requirements for laden oil barges
045. Operating requirements for exploration and production facilities
047. Requirements for flow lines at production facilities
055. Leak detection, monitoring, and operating requirements for crude oil transmission pipelines
065. Field-constructed aboveground oil storage tank requirements
066. Shop-fabricated aboveground oil storage tanks
075. Secondary containment requirements for aboveground oil storage tanks
080. Requirements for facility oil piping
085. Requirement for railroad tank cars and operations by rail
090. Repealed
What is a flow line?

18 AAC 75.990(173)
"flow line"
(A) means piping and associated fittings, including all valves, elbows, joints, flanges, pumps, and flexible connectors,
   (i) containing liquid oil;
   (ii) located at a production facility; and
   (iii) that is installed or used for the purpose of transporting oil between a well pad or marine structure used for oil production and the interconnection point with a transmission pipeline; and
(B) includes all piping between interconnections, including multi-phase lines and process piping, except
   (i) facility oil piping; and
   (ii) transmission pipelines;
What isn’t a flow line?

<table>
<thead>
<tr>
<th></th>
<th>Crude Oil Transmission Pipeline (COTP)</th>
<th>Flow Line (FL)</th>
<th>Facility Oil Piping (FOP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical size</td>
<td>8.625 – 48 inches</td>
<td>6.625– 36 inches</td>
<td>&lt;8 inches</td>
</tr>
<tr>
<td>(Outside diameter)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe Contents</td>
<td>Crude Oil (single phase, sale quality)</td>
<td>Multi-phase - Oil/produced water/gas (i.e. production lines)</td>
<td>Oil - include Crude, refined product, or multi-phase (on pad well lines)</td>
</tr>
<tr>
<td>ADEC Regulation</td>
<td>18 AAC 75.055</td>
<td>18 AAC 75.047</td>
<td>18 AAC 75.080</td>
</tr>
<tr>
<td>Leak Detection</td>
<td>Yes (1% daily throughput)</td>
<td>Single Wall: No Double Wall: Interstice Monitoring</td>
<td>No</td>
</tr>
<tr>
<td>Design Standard</td>
<td>No</td>
<td>Yes ASME B31.4, B31.8</td>
<td>Yes ASME B31.3, B31.4, B31.8</td>
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<tr>
<td>Cathodic Protection</td>
<td>No</td>
<td>Yes NACE RP0169</td>
<td>Yes NACE RP0169</td>
</tr>
<tr>
<td>Standard</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Corrosion Control</td>
<td>No</td>
<td>Yes ASMEB31.4, NACE RP0169</td>
<td>Yes NACE RP0169</td>
</tr>
<tr>
<td>Standard</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Inspection Standard</td>
<td>No</td>
<td>Yes API 570 (above ground)</td>
<td>Yes API 570</td>
</tr>
<tr>
<td>Maintenance Standard</td>
<td>No</td>
<td>Yes ASME B31.4, API 570</td>
<td>Yes API 570</td>
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<tr>
<td>Operation</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Flow Lines – Parts of Oil Production Facilities
General Concept...

Wells & Associated Piping
Processing Center

Crude Oil Pipelines
Federally Regulated
DEC regulates leak detection only

Flow Lines
DEC Regulated

TAPS
How are flow lines regulated?

Headings of 18 AAC 75.047

- Design & construction standards
- Corrosion monitoring & control
- Preventative maintenance
- Line markers
- Removal from service requirements
- Line supports
- Compliance documentation & recordkeeping
<table>
<thead>
<tr>
<th>ADEC REGULATION</th>
<th>DESCRIPTION</th>
<th>STANDARD ADOPTED BY REFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>18AAC75.047(a)</td>
<td>Applicability</td>
<td></td>
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<tr>
<td>18AAC75.047(b)</td>
<td>Design and Construction Standards <em>(Placed In-Service after December 30, 2008)</em></td>
<td>ASME B31.4-2002, or ASME B31.8-2003, or Equivalent Approved by Department</td>
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<tr>
<td>18AAC75.047(c)</td>
<td>Corrosion Program</td>
<td><em>NLT December 30, 2007</em></td>
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<tr>
<td>18AAC75.047(c)(1)</td>
<td>Corrosion Monitoring and Control</td>
<td>ASME B31.4 -2002, Chapter 8</td>
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<tr>
<td>18AAC75.047(c)(2)</td>
<td>External Corrosion Control Buried and Submerged Flowlines</td>
<td>NACE, RP 0169-2002</td>
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<tr>
<td>18AAC75.047(c)(3)</td>
<td>External Corrosion Control Aboveground Flowlines</td>
<td></td>
</tr>
<tr>
<td>18AAC75.047(c)(4)</td>
<td>Internal Corrosion Control</td>
<td></td>
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<tr>
<td>18AAC75.047(d)</td>
<td>Preventative Maintenance</td>
<td><em>NLT December 30, 2007</em></td>
</tr>
<tr>
<td>18AAC75.047(d)(1)</td>
<td>Flow Line Pipe-in-Pipe &amp; Approved Interstice Leak Detection</td>
<td></td>
</tr>
<tr>
<td>18AAC75.047(d)(2)</td>
<td>Preventative Maintenance Program</td>
<td></td>
</tr>
<tr>
<td>047(d)(2)(A)</td>
<td>– Submerged Flowline</td>
<td>ASME B31.4-2002, Chapter 7, 8, &amp; 9</td>
</tr>
<tr>
<td>047(d)(2)(B)</td>
<td>– Buried Flowline</td>
<td>ASME B31.4-2002, Chapter 7 &amp; 8</td>
</tr>
<tr>
<td>047(d)(2)(C)</td>
<td>– Aboveground Flowline</td>
<td>API 570 - 2003 (Excluding Section 8) and ASME B31.4-2002, Chapter 7 &amp; 8</td>
</tr>
<tr>
<td>047(d)(2)(D)</td>
<td>– All Flowlines</td>
<td></td>
</tr>
<tr>
<td>18AAC75.047(e)</td>
<td>Line Markers</td>
<td></td>
</tr>
<tr>
<td>18AAC75.047(f)</td>
<td>Removed from Service Requirements</td>
<td></td>
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<tr>
<td>18AAC75.047(g)</td>
<td>Aboveground Flowline Supports</td>
<td>ASME B31.4-2002; Paragraph 421</td>
</tr>
<tr>
<td>18AAC75.047(h)</td>
<td>Compliance Verification Documentation</td>
<td>Refers to 18AAC75.047 (c) and (d)</td>
</tr>
</tbody>
</table>
Similarities with Federal Requirements – one example

<table>
<thead>
<tr>
<th>49 CFR 195.581</th>
<th>18 AAC 75.080 (l)</th>
<th>18 AAC 75.047 (c)(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) You must clean and <strong>coat</strong> each pipeline or portion of pipeline that is exposed to the atmosphere, except pipelines under paragraph (c) of this section. (b) <strong>Coating</strong> material must be suitable for the prevention of atmospheric corrosion. (c) Except portions of pipelines in offshore splash zones or soil-to-air interfaces, you need not protect against atmospheric corrosion any pipeline for which you <strong>demonstrate by test, investigation, or experience</strong> appropriate to the environment of the pipeline that corrosion will- (1) <strong>Only be a light surface oxide</strong>; or (2) <strong>Not affect the safe operation of the pipeline before the next scheduled inspection</strong>.</td>
<td>The owner or operator of aboveground facility oil piping, other than piping specified in (m) of this section, shall ensure that the piping is protected from atmospheric corrosion by the application of a <strong>protective coating</strong> or by the use of <strong>corrosion-resistant material</strong> unless the owner or operator <strong>demonstrates by test, investigation, or experience</strong> appropriate to the environment of the piping segment that the anticipated extent of corrosion will (1) <strong>only be a light surface oxide</strong>; or (2) <strong>not affect the safe operation of the piping before the next scheduled inspection under a program developed under (j) of this section</strong> (i.e. API 570);</td>
<td>External corrosion control of aboveground flow lines by the application of a <strong>protective coating</strong>, by the use of <strong>corrosion-resistant alloys</strong> or by another method approved by the department, unless the operator demonstrates by <strong>test, investigation, or experience</strong> appropriate to the environment of the flow line segment, that the <strong>anticipated extent of corrosion will not affect the flow line’s fitness for service</strong>; and</td>
</tr>
</tbody>
</table>
3 Types of Flow Lines

(1) Aboveground

(2) Buried

(3) Submerged
Flow Line Compliance Review

I. Program Audit

II. Line Specific Review
   - Record Review
   - Field Inspection

III. Reporting
    - Checklists
    - Follow-up Correspondence
    - Enforcement Actions as necessary
Typically includes review of written guidance, policies, plans, procedures, etc. associated with:

1) Corrosion Control Program (ASME B31.4, NACE RP0169)
2) Preventative Maintenance Program (ASME B31.4, API 570)
3) Quality Assurance Program (API 570)
4) Data Management System
Line Specific **Record** Review

1) Maps, Sketches, Diagrams, P&IDs
2) Line pressure testing & service history
3) Data Management System
4) Corrosion Monitoring records
5) Maintenance & Repair records
   - Fitness for Service (FFS), remaining life, corrosion rate data and calculations
   - Block valve inspection & maintenance
6) Inspection/Testing/Surveying Records
   - Aboveground – API 570 reporting
   - Buried or submerged - Cathodic Protection System monitoring & surveying data
7) Spill/Leak History
8) Training records (Authorized Inspector (AI), Non-destructive Examination (NDE), Welding, Corrosion Expert)
Line Specific **Field** Inspections

Involves Visual Examination

- “Ground Truth” Entire Length, Visible Portions
- Vibration, Misalignment
- Damage & Repairs
- Line Structural Support (Saddles, VSM’s, HSM’s, etc)
- Signs of external corrosion
- Insulation systems (CUI)
- No testing involved
Corrosion Under Insulation (CUI)

- Significant cause of ext. corrosion (primarily North Slope issue)
- Insulated, non coated, warm pipe + water = corrosion
- Non sealed insulation = water ingress
- Difficult to detect
- Need to strip insulation to evaluate
Kenai/Cook Inlet Production Facilities

- Trading Bay Production Facility (Hilcorp)
- Granite Point Tank Farm (Hilcorp)
- Kustatan Production Facility (Cook Inlet Energy)
- West McArthur River Unit (Cook Inlet Energy)
- Middle Ground Shoals Production Facility (Hilcorp)
- Swanson River Field (Hilcorp)
### ADEC Regulatory Oversight

**Cook Inlet Oil Production Platforms**

<table>
<thead>
<tr>
<th>Trading Bay</th>
<th>Granite Point</th>
<th>Kustatan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dolly Varden</td>
<td>6. Anna</td>
<td>11. Osprey*</td>
</tr>
<tr>
<td>2. Grayling</td>
<td>7. Bruce</td>
<td></td>
</tr>
<tr>
<td>3. King Salmon</td>
<td>8. Granite Pt</td>
<td></td>
</tr>
<tr>
<td>4. Monopod</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Steelhead</td>
<td></td>
<td>9. A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10. C</td>
</tr>
</tbody>
</table>

*No production fluids processed at the platform*
Scraping/Cleaning Pigs

In-Line Inspection (ILI) “Smart” Pigs
## Flow Lines
### Cook Inlet Platforms

<table>
<thead>
<tr>
<th></th>
<th>Operator</th>
<th>Platform</th>
<th>Equip ID</th>
<th>Line Service</th>
<th>Year Online</th>
<th>Line Start</th>
<th>Line End</th>
<th>Length (ft)</th>
<th>NPS</th>
<th>Nom Wall t</th>
<th>Maint Pig</th>
<th>ILI Capable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CIE</td>
<td>Osprey</td>
<td>8&quot;PC-3114-FA</td>
<td>3 phase</td>
<td>2002</td>
<td>Osprey</td>
<td>Shore Vault</td>
<td>10,546</td>
<td>8</td>
<td>0.750</td>
<td>weekly</td>
<td>Y</td>
</tr>
<tr>
<td>2</td>
<td>CIE</td>
<td>Osprey</td>
<td>8&quot;PC-3126-FA</td>
<td>3 phase</td>
<td>2002</td>
<td>Shore Vault</td>
<td>Kusta</td>
<td>8,638</td>
<td>8</td>
<td>weekly</td>
<td>Y</td>
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<tr>
<td>3</td>
<td>CIE</td>
<td>Osprey</td>
<td>8&quot;PW-3152-GA</td>
<td>PW</td>
<td>2002</td>
<td>Kustatan</td>
<td>Osprey</td>
<td>19,184</td>
<td>8</td>
<td>0.875</td>
<td>weekly</td>
<td>Y</td>
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<tr>
<td>4</td>
<td>Hilcorp</td>
<td>Anna</td>
<td>Anna A</td>
<td>2 phase</td>
<td>1967</td>
<td>Anna</td>
<td>Bruce</td>
<td>8,813</td>
<td>8</td>
<td>0.594</td>
<td>3X week</td>
<td>Y</td>
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<tr>
<td>5</td>
<td>Hilcorp</td>
<td>Bruce</td>
<td>Bruce GP1</td>
<td>2 phase</td>
<td>1974</td>
<td>Bruce</td>
<td>GPTF</td>
<td>28,042</td>
<td>8</td>
<td>0.864</td>
<td>3X week</td>
<td>Y</td>
</tr>
<tr>
<td>6</td>
<td>Hilcorp</td>
<td>Granite Pt</td>
<td>Granite Point B</td>
<td>2 phase</td>
<td>1966</td>
<td>Granite Pt</td>
<td>GPTF</td>
<td>32,340</td>
<td>8</td>
<td>0.719</td>
<td>2X week</td>
<td>Y</td>
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<tr>
<td>7</td>
<td>Hilcorp</td>
<td>Dol. Varden</td>
<td>Dolly Varden A</td>
<td>2 phase</td>
<td>1967</td>
<td>Dol. Varden</td>
<td>TBPF</td>
<td>30,352</td>
<td>8</td>
<td>0.719</td>
<td>3X week</td>
<td>Y</td>
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<tr>
<td>8</td>
<td>Hilcorp</td>
<td>Grayling</td>
<td>Grayling A</td>
<td>2 phase</td>
<td>1967</td>
<td>Grayling</td>
<td>TBPF</td>
<td>34,102</td>
<td>10</td>
<td>0.750</td>
<td>3X week</td>
<td>Y</td>
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<tr>
<td>9</td>
<td>Hilcorp</td>
<td>King Salmon</td>
<td>King Salmon A</td>
<td>2 phase</td>
<td>1966</td>
<td>King Salmon</td>
<td>TBPF</td>
<td>37,863</td>
<td>8</td>
<td>0.719</td>
<td>2X week</td>
<td>Y</td>
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<tr>
<td>10</td>
<td>Hilcorp</td>
<td>Monopod</td>
<td>Monopod A</td>
<td>2 phase</td>
<td>1966</td>
<td>Monopod</td>
<td>TBPF</td>
<td>47,624</td>
<td>8</td>
<td>0.719</td>
<td>Daily</td>
<td>Y</td>
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<tr>
<td>11</td>
<td>Hilcorp</td>
<td>Steelhead</td>
<td>Steelhead C</td>
<td>2 phase</td>
<td>1986</td>
<td>Steelhead</td>
<td>TBPF</td>
<td>34,439</td>
<td>8</td>
<td>0.500</td>
<td>3X week</td>
<td>Y</td>
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<tr>
<td>12</td>
<td>Hilcorp</td>
<td>Platform A</td>
<td>A-Line</td>
<td>3 phase</td>
<td>1965</td>
<td>A</td>
<td>MGSP F</td>
<td>36,960</td>
<td>8</td>
<td>0.592</td>
<td>4X week</td>
<td>N</td>
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<tr>
<td>13</td>
<td>Hilcorp</td>
<td>Platform C</td>
<td>B-Line</td>
<td>3 phase</td>
<td>1967</td>
<td>C</td>
<td>A</td>
<td>12,144</td>
<td>8</td>
<td>0.592</td>
<td>4X week</td>
<td>N</td>
</tr>
</tbody>
</table>
Flow Lines
Cook Inlet Platforms

- Heavy Pipe Wall Thickness (0.500-0.864”)
- Pipe Coatings
- Routine Line Pigging
- In-Line Inspection Capabilities (most)
- Chemical Injection & Corrosion Monitoring
- Cathodic Protection Systems (submerged & buried)
- Production Lines to/from Seabed Inside Platform Legs
- Regulated as flow lines since 2007
- Federally regulated since mid 1990’s
Inspect Visible Portions of Line

- Insulated Lines on Deck
- Platform Leg Exterior
- Lines Inside Platform Leg
Chemical Injection, Monitoring, Transfer, & Storage

- Corrosion Inhibitor
- Oxygen Scavenger
- Biocides
- Scale Inhibitor
Pig Launcher (platform)
Receiver (shore side)
Cathodic Protection

- Impressed Current (IC)
- Monthly Checks
- Annual System Testing

Isolating Valves

- Yearly Maintenance
- Accessible Location
- Protected from Damage
Platform Storage “Girder” Tanks
Platform Storage Tanks

- Girder Tank Layout
- Cellar Deck
- Radial Configuration Monopod
Platform Storage Tanks

- UT Scan Non-Destructive Examination
- Girder Tank Testing
- Refined Product Storage & Transfer
On-Shore Production Facilities

- Shoreline Transition
- Onshore Vaults
- Soil/Air Interface
- Pipe Manifolding
- Facility Piping & Tank Systems
On-Shore Production Facilities

- Slop Oil Storage
- Facility Oil Piping
- Crude Oil Storage
- Refined Product
- Tank Truck Loading Area
- API 653, API 570, NACE CP Reporting
On-Shore Production Facilities

Upgrade/Replacement Bolted to Welded Construction

New Construction Inspections
On-Shore Production Facilities

Swanson River Field

42 Flow Lines

Aboveground Storage Tanks

Manifold Bldg

Well Pad

Chemical Storage & Injection
SRF: Extensive Cathodic Protection System (for corrosion control)
Flow Line Program Achievements
CY 2009-2015

- Compliance Evaluation Program Overview Drafted

- Checklists Drafted
  - Audit
  - Compliance Evaluation (Aboveground, Buried/Submerged)
  - Repair Review
  - Offshore Platforms
  - Construction Inspection

- Initial Program Audits Completed
  NORTH SLOPE
  - BPXA Greater Prudhoe Bay
  - CPAI Kuparuk & Alpine
  - Pioneer Oooguruk (off-shore)
  - ENI Petroleum Nikaitchuq (off-shore)

  KENAI/COOK INLET
  - Chevron (Hilcorp Alaska) Swanson River Field
  - XTO Energy CI Production Facility & Platforms
  - Hilcorp Alaska Trading Bay & Granite Point & Platforms
  - Cook Inlet Energy Kustatan, West Mac & Platform

- Line Specific Compliance Reviews
  - 419 Flow Lines = 926 line miles

- Repair & Mitigation Reviews

- Design Reviews & Construction Inspections
  - North Slope area
  - XTO MGS
## Flow Line Program Achievements

**CY2009-2015**

### Line Specific Reviews

<table>
<thead>
<tr>
<th>Period State Fiscal Year</th>
<th>North Slope (Total FL’s = 371)</th>
<th>Kenai/Cook Inlet (Total FL’s = 53)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BPXA PBU (FL# = 225)</td>
<td>CPAI KRU (FL# = 137)</td>
</tr>
<tr>
<td></td>
<td>Pioneer Oooguruk, ENI Nikaitchuk, CPAI Alpine (FL# = 9)</td>
<td>Hilcorp SRF, Cook Inlet (FL# = 53)</td>
</tr>
<tr>
<td></td>
<td># Flowlines Completed</td>
<td>Line Miles</td>
</tr>
<tr>
<td>SFY11</td>
<td>41</td>
<td>150</td>
</tr>
<tr>
<td>SFY12</td>
<td>30</td>
<td>59</td>
</tr>
<tr>
<td>SFY13</td>
<td>85</td>
<td>153</td>
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<tr>
<td>SFY14</td>
<td>34</td>
<td>54</td>
</tr>
<tr>
<td>SFY15</td>
<td>35</td>
<td>99</td>
</tr>
<tr>
<td>Totals</td>
<td>225</td>
<td>515</td>
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<tr>
<td>% Complete</td>
<td>100%</td>
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