Self-Contained Self-Rescuer Capacity

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Regulatory Requirements

- **30 CFR 75.1714** - Each operator shall make available to each miner who goes underground, and to visitors authorized to enter the mine by the operator, an approved self-rescue device which is adequate to protect such person for one hour or longer.

- **42 CFR Part 84** – Classification of respiratory protection devices by duration of use to a laboratory test standard
  - Open circuit – machine test
  - Closed circuit – man test

- **MINER Act of 2006** – Added redundancy to 30 CFR 75.1714

- **CCER Regulation** – The proposed regulation is in terms of capacity rather than duration
SCSRs provide for your breathing needs when the air around you is unbreathable.
When you take a breath of air into your lungs, you use oxygen and give off (exhale) carbon dioxide.
Plants do the opposite:
They absorb carbon dioxide and give off oxygen.
What happens if you breathe back and forth from a plastic bag?

- Oxygen decreases
- Carbon dioxide increases
First Concept

- SCSR contain a certain quantity of oxygen. If you use it up faster, it won’t last as long.
- SCSR do not provide a fixed time of protection.
Second Concept

- Cars have gas mileage; humans have oxygen mileage
- If you put a gallon of gas in a car, it can travel a certain distance. If you give a man a liter of oxygen, he can also travel a certain distance. Speed has little effect on travel distance in both cases.
O₂ consumption and O₂ consumption/speed

O₂ consumption rate

O₂ consumption rate/speed

Speed, m/s
Third Concept

- Just as a gallon of gas will generally take a smaller car farther than a larger car, the lighter you are, the farther your SCSR will take you.
Gas mileage and gas usage for Large Car versus Small Car

**Large car**
- 20 miles/gallon
  - or
- 0.050 gallon/mile

**Small car**
- 40 miles/gallon
  - or
- 0.025 gallon/mile
Approximate Travel Distance vs. User's Weight
Upright, Level Walking, Flat Ground, 100 L of Oxygen
(assuming similar physical fitness)
Fourth Concept

- Body posture affects your possible travel distance.
- Upright walking is the highest oxygen mileage position and the possible travel distance is greatest.
Approximate Travel Distance vs Posture for a 150-lb man with 100 L of Oxygen
Fifth Concept

- Different models of apparatus contain different quantities of oxygen.
Quantity Of Usable Oxygen

<table>
<thead>
<tr>
<th>Product</th>
<th>Liters of Oxygen, STPD</th>
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<tbody>
<tr>
<td>CSE SR-100</td>
<td>90</td>
</tr>
<tr>
<td>Draeger OXY K PLUS</td>
<td>110</td>
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<tr>
<td>MSA Life-Saver 60</td>
<td>100</td>
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<tr>
<td>Ocenco EBA 6.5</td>
<td>140</td>
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<tr>
<td>Ocenco M-20</td>
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Summary

• Apparatus selection is based on user need
  – Assessment under extreme conditions
  – Simulated escape route

• Estimated oxygen capacity needs are based on a variety of factors
  – Size of user
  – Environmental conditions
    • Level vs. sloped
    • Seam height
  – Estimated oxygen capacity needs are based on a variety of factors
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