REGULATION ENFORCEMENT GUIDELINES

195.410(b) Condition Adversely Affecting Safe Operation - Electrically Shorted Casing

1. A violation of Section 195.401(b) exists if:

   A cathodically protected hazardous liquid pipeline is electrically connected to metallic casings that are a part of the underground system and the operator has not taken corrective action within six months of discovery to initiate plans for correction of the short. Discovery shall be presumed upon conduct of an electrical survey with results as described in Paragraph 2(a).

   The operator's procedures required by Section 195.402 should also be investigated to:

   a. Determine that the operator has a written procedure to react to shorted casings.

   b. Determine that the operator follows the written procedure.

2. Evidence of violation - Section 195.401(b):

   a. Documentation and dates of pipe-to-soil potential surveys made pursuant to Section 192.416 that show pipe-to-soil and adjacent casing-to-soil potentials to be essentially the same, indicating an electrical short between casing and pipe.

   Notes:

   A zero resistant short, as in (a) prevents cathodic protection from reaching the pipeline inside the casing and thus prevents the operator from complying with Sections 195.414(a) for those pipe sections.

   b. Field checks for violation of Section 195.401(b):

      i. At locations where pipe-to-soil and adjacent casing-to-soil measurements are essentially the same, the presence of an electrical short can be readily checked by using a method developed by Panhandle Easter Pipeline Company. This method involves measuring carrier-to-casing potentials while increasing reverse current to the casing. The magnitude of reverse current required to produce an increase in potential difference between carrier and casing is a measure of the net

resistance between the carrier and casing. Normally, the casing can be driven increasingly positive with respect to the carrier pipe. If a low resistance short circuit exists between carrier and casing, even large reverse currents will not cause a separation of carrier and casing potentials. In AGA's "A Study of Cathodic Protection of Buried Steel Pipeline Within a Steel Casing" this method was conducted for different metallic resistances between carrier and casing. The results show that for a low resistance short circuit, increasing the voltage between the casing and soil electrode did not significantly increase the voltage drop between the casing and carrier pipe. (It should be noted that because of availability, variable voltage DC source was used rather than variable current.)

ii. Have operator interrupt rectifier located some distance away from shorted casing; at least a mile away would be preferable. If it has to be closer; be sure that casing and pipe at point of measurement is not within the voltage gradient of the rectifier groundbed.

These interrupted voltage checks will serve to verify the presence of a short between casing and pipe.

c. Operator records:

i. Pipe-to-soil and casing-to-soil potential measurements should be retained by the operator in accordance with Section 195.404(c)(3).

d. Operator's O&M Plan:

i. To comply with the requirements of Section 195.402, the operator's O&M Plan must incorporate procedures to be used for correcting or negating the adverse effects of shorted casings. Then, consistent with Section 195.402(a), the operator is to follow the written procedures that it has established.

3. <u>Reasonable time allowance and method for operator's correction of shorted casings</u>:

a. After the cathodic protection survey has been completed and a shorted casing has been identified, the operator should have determined a course of action intended to correct or negate the adverse effects of shorted casings. The operator's plan of action should be initiated within six months of completion of the survey and should include one

of the following options or an equivalent option developed by the operator.

i. Clear the short, if practical;

ii. Fill the casing/pipe interstice with high dielectric casing filler or other material which provides a corrosion inhibiting environment;

iii. If options (i) or (ii) would be impractical and, if in the judgment of the operator the risk of corrosion is minimized by conditions including the location and condition of the pipe, the risk of overpressure, and environmental factors, the operator may choose to monitor the casing with leak detection instruments at intervals not exceeding 7 1/2 months, but at least twice each calendar year until such time as options (i) or (ii) become practical or conditions which render option (iii) inadequate to minimize the risk of corrosion.

If the operator chooses to monitor the shorted casing with leak detection instruments, immediate corrective action must be taken if and when a leak is discovered. A corrosion leak is a condition that would render option (iii) inadequate.

b. If an inhibitor is used, the operator must be able to demonstrate by periodic sampling that the inhibitor will stay in the casing/pipe interstice without leaching out the ends into the soil during low water tables.

c. In lieu of the above options an operator may use an internal inspection device, such a lin-a-log. If corrosion is detected on the carrier pipe inside the casing, the operator must have a written procedure to evaluate the extent and severity of the corrosion and a means for correction. The written procedure must contain a frequency for reevaluation.

d. If the operators [sic] procedures do not include a procedure for reacting to shorted casings, the operator should be required to amend his procedures per Section 195.402(b).

4. General Notes:

a. In Section 195.414 for liquid pipelines, the meaning of "active corrosion" is not the same as in Section 192.467 for gas pipelines. In Part 195, active corrosion means the pipe is corroding where direct

current is leaving the pipe and is not necessarily associated with a hazard to public safety.

b. To cathodically protect a pipeline means to cathodically protect it in its entirety. This point is not spelled out as clearly in Part 195 as in Part 192. However, this protection requirement is well understood in the industry.

It should be noted that the section of pipeline in a casing is not protected whenever casings are shorted to the pipeline because of the shielding effect of the casings that prevents cathodic protection current from reaching the pipeline inside the casing.

192.467 External Corrosion Control - Electrical Isolation

Electrically shorted casing:

1. A violation of Section 192.467(c) exists if:

A cathodically protected transmission or distribution pipeline, other than unprotected copper inserted into ferrous pipe, is electrically connected to metallic casings that are a part of the underground system; and, within six months of discovery of the electrical short between the casings and pipeline, the operator has not initiated corrective action in accordance with Paragraph 3 below. Discovery shall be presumed upon conduct of an electrical survey with results as described in Paragraph 2(a).

The operator's Operation and Maintenance (O&M) Plan should also be investigated to:

a. Determine that the operator has a written procedure to react to shorted casings per Section 192.605, and:

b. Determine that the operator follows that procedure per Section 192.13(c).

2. Evidence of violation - Section 192.467(c):

a. Documentation and dates of pipe-to-soil potential surveys made pursuant to Section 192.465 that show pipe-to-soil and adjacent casing-to-soil potentials to be essentially the same, indicating an electrical short between casing and pipe.

Notes:

A zero resistant short, as in (a) prevents cathodic protection from reaching the pipeline inside the casing, and thus prevents the operator from complying with Sections 192.455(a)(2) and 192.457(a) for those pipe sections.

b. Field checks:

i. At locations where pipe-to-soil and adjacent casing-to-soil measurements are essentially the same, the presence of a electrical short can be readily checked by using a method developed by Panhandle Eastern Pipeline Company. This method involves measuring carrier to casing potentials while increasing reverse current to the casing. Normally, the casing can be driven increasingly positive with respect to the carrier pipe. If a low resistance short circuit exists between carrier and casing, even large reverse currents will not cause a separation of carrier and casing potentials. In AGA's "A Study of Cathodic Protection of Buried Steel Pipeline Within a Steel Casing" this method was conducted for different metallic resistances between carrier and casing. The results show that for a low resistance short circuit, increasing the voltage between the casing and soil electrode did not significantly increase the voltage drop between the casing and carrier pipe. (It should be noted that, because of availability, variable voltage DC source was used rather than variable current.)

Thus, when a carrier and casing are at essentially the same potential, and they cannot be caused to become appreciably different in potential with several amperes of current to the casing, it is evident that a low resistance connection exists between carrier and casing.

ii. Have operator interrupt rectifier located some distance away from shorted casing; at least a mile away would be preferable. If it has to be closer, be sure that casing and pipe at point of measurement is not within the voltage gradient of the rectifier groundbed.

These interrupted voltage checks will serve to verify the presence of a short between casing and pipe.

c. Operator records:

Pipe-to-soil and casing-to-soil potential measurements should be retained by the operator in accordance with Section 192.421(b)(2).

d. Operator's O&M Plan:

To comply with the requirements of Sections 192.467(c), 192.453, and 192.605, the operator's O&M Plan must incorporate procedures to be used for correcting or negating the adverse effects of shorted casings. Then, consistent with Section 192.13(c), the operator is to follow the procedures that it has established.

3. Reasonable time allowance and method for operator's correction of shorted casings:

a. After the cathodic protection survey has been completed and a shorted casing has been identified, the operator should have determined a course of action intended to correct or negate the adverse effects of shorted casings. The operator's plan of action should be initiated within six months of completion of the survey and should include one of the following options or an equivalent option developed by the operator:

i. Clear the short, if practical;

ii. Fill the casing/pipe interstice with high dielectric casing filler or other material which provides a corrosion inhibiting environment:

iii. If options (i) or (ii) would be impractical, and if, in the judgment of the operator, the risk of corrosion is minimized by conditions including the location and condition of the pipe, the risk of overpressure, and environmental factors, the operator may choose to monitor the casing with leak detection instruments at intervals not exceeding the requirements of Sections 192.705 and 192.721 until such time as options (i) or (ii) become practical or conditions change which render option (iii) inadequate to minimize the risk of corrosion.

If the operator chooses to monitor the shorted casing with leak detection instruments, immediate corrective action must be taken if and when a leak is discovered. A corrosion leak is a condition that would render option (iii) inadequate.

b. If an inhibitor is used, the operator must be able to demonstrate by periodic sampling that the inhibitor will stay in the casing/pipe interstice without leaching out the ends into the soil during low water tables.

c. In lieu of the above options, an operator may use an internal inspection device, such as lin-a-log. If corrosion is detected on the carrier pipe inside the casing, the operator must have a written procedure to evaluate the extent and severity of the corrosion and a means for correction. The written procedure must contain a frequency for reevaluation.

4. Road and railroad casings are in areas where continuing pipeline corrosion is considered to be detrimental to public safety.

a. The Office of Pipeline Safety (OPS) Pipeline Safety Enforcement Manual, pages 5.2–1–6 and –7, under Part D relative to definition and enforcement guidelines for Section 192.457(c), provide the following guide material:

"In order to achieve uniform enforcement policy, all regions should consider continuing corrosion occurring in the following areas to be detrimental to public safety (active corrosion):

1 . . . .
2 . . . .
3 . At highway and railroad crossings.
4 . . . ."

b. Thus, all highway and railroad crossings involving cathodically protected gas pipelines must be electrically isolated from the casing, or other measures must be used to mitigate or monitor galvanic corrosion of the pipeline inside the shorted casing.

5. General notes:

a. To cathodically protect a pipeline means to cathodically protect it in its entirety. It should be noted that a pipeline is not protected in its entirety, as required by Sections 192.455 or 192.457, whenever casings are shorted to the pipeline because of the shielding effect of the casings that prevents cathodic protection current from reaching the pipeline inside the casing.