APÉNDICE B

CORROSION GUIDELINES

B.1 Considerations. The following *guidelines* are recommended for determining corrosion considerations for an applicable vessel:

B.1.1 Well streams that contain water as a liquid and any or all of the following gases are considered to be corrosive and are due consideration under these specifications (reference API RP 14E, ASME Code, NACE MR-01-75 and MR-05-75):

a. Oxygen — 0_2

b. Carbon Dioxide — CO_2

c. Hydrogen Sulfide — H_2S

B.1.2 The following guidelines are not mandatory but may be used to judge the extent of the corrosive environment, with respect to carbon steels:

a. Oxygen

(1) Less than 0.005 ppm in natural brine — non-corrosive

(2) From 0.005 ppm to 0.025 ppm requires consideration

(3) Greater than 0.025 ppm in natural brine — corrosive

b. Carbon Dioxide

(1) Less than 600 ppm in natural brine — non-corrosive

(2) From 600 ppm to 1200 ppm requires consideration

(3) Greater than 1200 ppm in natural brine — corrosive

c. Hydrogen Sulfide

(1) No lower limit of hydrogen sulfide has been identified as being non-corrosive. With hydrogen sulfide presence, the environment should be considered corrosive.

(2) NACE Standard MR-01-75 (latest edition) should be used for all cases of hydrogen sulfide content for judgment of the possibility of Sulfide Stress Cracking (SSC) and is extracted as follows: "Systems operating below 65 psia total pressure or below 0.05 psi H_2S partial pressure are outside the scope of this standard."

B.1.3 Should alloy steel or stainless steel be used, other forms of corrosion should be considered such as, but not limited to, chloride stress cracking.

B.1.4 Some of the other factors that influence corrosion in a given vessel include: temperature, pressure, fluid velocities, metal stress and heat treatment, vessel surface condition, and time.

B.2 Corrosive Environment Practices.

B.2.1 If the environment is judged as being subject to SSC from the criteria of NACE MR-01-75 as stated in B.1.2 above, then all provisions of this NACE Standard as apply to the vessel materials and construction shall be followed.

B.2.2 If the environment is judged as corrosive from any of the other criteria stated in B.1.2 above, the intent of this specification will be met provided any one or combination of the following practices are used:

a. An allowance for corrosion to the vessel parts may be made according to the ASME Code, Appendix E, *Suggested Good Practices Regarding Corrosion Allowance.*

b. Either sacrificial or impressed current anodes may be used, providing that the area of the corrosion attack *can physically be* protected by use of these anodes (NACE Ref. RP-05-75).

c. Corrosion effects may be controlled with holiday-free internal coatings on all exposed metal surfaces. NACE Standards RP-01-81 *(Recommended Practice: Liquid Applied Internal Protective Linings and Coatings for Oil Field Production Equipment)* and RP-01-78 *(Design, Fabrication, and Surface Finish of Metal Tanks and Vessels to be lined for Chemical Immersion Service)* present guidelines and procedures for coating vessels such as oil and gas separators.

d. Corrosion effects may be disregarded provided they can be shown to be negligible or entirely absent on a historical basis. However, the system should be monitored periodically for possible new corrosion (Reference API 510).

e. Corrosion effects may be reasonably controlled with chemical inhibitor treatments.

B.2.3 Post weld heat treatment is recommended for carbon steel vessels for use in acid gas (containing hydrogen sulfide and/or carbon dioxide) service. Post weld heat treatment may be required by ASME Code regardless of corrosion considerations.