STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION COMMISSION

2006 MAR 17 PM 2 5

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

CASE NO. 13589

APPLICATION OF DUKE ENERGY FIELD SERVICES, LP FOR AN ACID GAS INJECTION WELL, LEA COUNTY, NEW MEXICO.

CLOSING STATEMENT AND RESPONSE TO OIL CONSERVATION DIVISION TESTIMONY

On Monday, March 13, 2006, at the conclusion of the presentation of evidence, the Oil Conservation Commission continued the hearing on the application of Duke Energy Field Services ("DEFS") until Monday March 20th. Duke hereby submits its Closing Statement in this case.

I. INTRODUCTION

In this case, DEFS seeks approval of its Application for Authorization to Inject acid gas in its proposed Linam AGI Well No. 1 ("the Linam Well"). The standards and procedures for the approval of a disposal well (Class II Injection) well are prescribed in Division Rule 701[1] and Division Form C-108. *See* N.M.A.C. 19.15.9.701 (2006). Division Form C-108 requires the submittal of data supporting the application to inject attaching the data required by the form and Rule 701 et seq.

DEFS duly filed its application on September 12, 2005 and on September 16, 2005 the Division wrote DEFS and made twelve specific recommendations concerning the Linam Well. The Division advised DEFS that the case would not be handled administratively but would be set for hearing before the Oil Conservation Commission. The case was heard by the Commission on March 13, 2006.

[1] Division Rule 701 through 708 provide additional requirements for injection wells.

At the hearing, DEFS reviewed its safety plans and procedures for the Linam Well and related facilities, explained the geological basis for the selection of the location for this well, and summarized the details of its Application for Authorization to Inject. DEFS also responded to each of the requests made by the Division. *See* Tr. 9 (Testimony of Mr. Will Jones). At the conclusion of DEFS's testimony, it showed that it had complied with all requirements in the C-108 Form, Division Rules and the additional requirements imposed the Division.

Following the presentation of DEFS' evidence, affected parties had a full opportunity to appear and comment on the proposed well and project. In fact, the Commission liberally allowed the statements of the representative from the Maddox Plant.

The Division then called an engineering witness, Will Jones, who acknowledged that "the geology was extremely well thought out." *See* Tr. 8 (Jones Testimony). Mr. Jones also stated that he had found "no hydrocarbon bearing horizon" in the proposed injection formation (Tr. 20 & 30), agreed that the project had "adequate safety devices" and stated he liked what DEFS had proposed (Tr. 38). The Division then called its Environmental Bureau Chief, Wayne Price, who characterized the way DEFS was handling the safety issues at the proposed acid gas injection well as "state-of-the art." *See* Tr. 54.

II. EXTRANEOUS ISSUES SHOULD NOT BE CONSIDERED BY THE COMMISSION

At the hearing, the Division raised issues and made certain recommendations that are outside its own rules and that are not pertinent to the issues in this case. These extraneous issues included: (1) a "recommendation" for horizontal drilling of the Linam Well; and (2) a new requirement for public participation, and possible hearings, on the hydrogen sulfide (H2S) contingency plan for the Linam Ranch Acid Gas Facility.

The Rules of the Division require that parties to an adjudicatory proceeding who intend to present evidence at the hearing file a pre-hearing statement that contains "a concise statement of the case" *See* N.M.A.C. 19.15.14.1211(B)(1)(b)(2006). In accordance with the provisions of this rule, the Division filed its pre-hearing statement on

March 9th and attached thereto its proposed exhibits. These exhibits included Division Exhibit C entitled "Division Engineering Bureau Recommendations to Consider while permitting the DEFS Linam AGI Well No. 1" that contained numerous recommendations concerning how the Linam Well should be drilled, completed and operated. DEFS reviewed the recommendations of the Division and accepted them for this project. However, at the hearing, the Division also made recommendations that had never been disclosed to DEFS either at the pre-hearing conference, or its pre-hearing statement.

A. Horizontal Drilling

Although its testimony is not entirely clear, the Division recommended that the Commission consider requiring the directional or horizontal drilling of the Linam Well. Although Will Jones, the Division's engineering witness, stated that he realized "that's not the issue at hand here," he also testified that he thought horizontal drilling would be feasible. *See* Tr. 21. On the other hand, Mr. Jones also recognized that the ability to drill a horizontal Acid Gas Injection Well would cost more, would "have to be driven by geologic concerns or the geologic target here", and would have a greater potential for failure. *See* Tr. 20, 22-23.

Attached to this Closing Statement as Exhibit A is an Affidavit of Alberto Gutierrez, DEFS' geological witness. As he touched on at the hearing, Mr. Gutierrez explains why the completion of a deviated or horizontal well for acid gas injection at this site is not a feasible option for it would tremendously increase the risks and costs of drilling the well. DEFS respectfully requests that Exhibit A be made a part of the record in this case.

B. Hydrogen Sulfide Contingency Plan

Pursuant to Division Rule 118, DEFS is required to obtain an approved H2S contingency plan before it drills the Linam Well and an approved, detailed plan prior to commencement of injection operations. Nothing in this Rule provides for public notice and an opportunity for hearing on these plans. *See* N.M.A.C. 19.15.3.118 (2006); *see also Bettini v. Las Cruces*, 82 N.M. 633, 485 P. 2d 967 (N.M. 1971)("Where authority is given to do a particular thing and the mode of doing it is prescribed, it is limited to be done in that mode; all other modes excluded..."). However, the Division recommended

that the Commission place a condition in its order requiring a public participation process, including possible hearings, on the H2S contingency plan for the Linam Ranch Acid Gas Facility. *See* Tr. 66 (Testimony of Mr. Price).

In considering this Application for Authorization to Inject, the Commission is bound by the standards set out in its rules and procedures. *Pub. Serv. Co. of N. M. v. N. M. Envtl. Improvement Bd.*, 89 N.M. 223, 549 P.2d 638 (N.M. Ct. App. 1976)(Finding "[t]he Board having set the standard is bound by it, the same as any one else."). If the Commission wishes to amend the rules, it may only do so after notice and hearing. *Pub. Serv. Co.*, 549 P. 2d at 645.

The Commission may not alter the rules that govern this case nor may it apply different standards or procedures to DEFS. *See Wagner v. AGW Consultants*, 137 N.M. 734, 114 P. 3d 1050 (N.M. 2005) ("The New Mexico Constitution provides that no person shall be denied equal protection of the laws. Like its federal equivalent, this is essentially a mandate that similarly situated individuals be treated alike, absent a sufficient reason to justify disparate treatment.")(internal citations omitted). In other words, the Commission and the Division may not use the Water Quality Control Commission public comment provisions to bootstrap hearings into Oil Conservation Division Rules where no hearing is authorized.

This process would create a standard-less review where there is no end to the administrative process. *See Gonzales v. N. M. Educ. Retirement Bd.*, 109 N.M. 592, 788 P.2d 348 (N.M. 1990)(Finding that the board has authority to set out by regulation an application process but does not "have the statutory power to create unreasonable or irrelevant requirements within the application process, before it considers an application.") Any requirement for an additional public hearing on an H2S Contingency Plan goes beyond the rules and imposes unreasonable additional requirements that will prevent the project from going forward. DEFS cannot drill the well and test the formation if its application will be subject to a second public hearing where technical safety issues will be resolved in a proceeding based on a record made by non-technical people. DEFS cannot proceed outside the rules of the Division.

Attached is Exhibit B which is DEFS' Draft H2S Contingency Plan. It is DEFS' belief that his plan comports with other plans submitted for similar facilities and may in fact be more thorough than what has been required by the Division in the past.

III. CONCLUSION

In this case, DEFS has met all the requirements of the Oil Conservation Division for approval of an acid gas injection well permit. Even Mr. Price testified that nothing more is needed and no conditions need to be imposed in the Commission order approving DEFS' application. [2]

There has been a public hearing and the public has had a full opportunity to present evidence and comment on the proposal. Now it is time for the Commission to employ its technical expertise, approve this state-of-the-art facility, and impose safety requirements based on the collective technical expertise of the agency and the applicant. Any subsequent approvals needed form the Division or WQCC should then be obtained under current rules and practice. Finally, because the Commission may not change its rules or procedures in this case and because DEFS has complied with all requirements in the rules and imposed by the Division, DEFS respectfully submits that this application for approval of an acid gas injection well should be approved.

Respectfully submitted,

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[2] When Mr. Price was asked if there was anything that the Commission needs to take into consideration or conditions that it needs to add to the permit, to address the concerns he had raise about the application, he replied that no conditions were required before the permitting the well. *See* Tr. 56-57.

ATTORNEY FOR DUKE ENERGY FIELD
SERVICES, LP

CERTIFICATE OF SERVICE

I certify that on March 17, 2006 I served a copy of the foregoing document to the following by

- ☐ U.S. Mail, postage prepaid
- ☒ Hand Delivery
- ☐ Fax
- ☐ Electronic Service by LexisNexis File & Serve

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STATE OF NEW MEXICO
DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES
OIL CONSERVATION COMMISSION

APPLICATION OF DUKE ENERGY FIELD SERVICES, LP FOR APPROVAL OF AN ACID GAS INJECTION WELL, LINAM RANCH AREA, LEA COUNTY, NEW MEXICO. **CASE NO. 13589**

AFFIDAVIT OF ALBERTO A. GUTIERREZ, C.P.G.

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

I, Alberto A. Gutiérrez, C.P.G., being first duly sworn on oath, states as follows:

My name is Alberto A. Gutiérrez. I reside in Bernalillo County, New Mexico. I am the Certified Professional Geologist employed by Duke Energy Field Services, LP (DEFS) who is familiar with the application in the Application of Duke Energy Field Services, LP For Approval Of An Acid Gas Injection Well, Linam Ranch Area, Lea County, New Mexico

In my direct testimony provided at the New Mexico Oil Conservation Commission (OCC) hearing on March 13, 2006, with respect to OCC Case #13589, I testified that the drilling and completion of an inclined or horizontal well for the acid gas injection (AGI) purposes was not a feasible option at this site. This affidavit contains the product of additional analyses and review and supplements testimony provided at the hearing to address the unanticipated testimony of the OCD's witness, Mr. William Jones, P.E., regarding the potential consideration by DEFS of the installation of an inclined or horizontal AGI well at the Linam site.

There are numerous reasons why the OCC should not consider the installation of an inclined or horizontal AGI well from the Linam Ranch Plant to the location that is the subject of this application as a feasible alternative to the proposed location of the well and above-ground facilities. These reasons include the following:

1. The use of inclined or horizontal wells for AGI is unproven and inherently more unreliable and risky than the installation of the established proven technology of over 90 successfully operating vertical AGI wells in North America, including at least three in SE New Mexico.
2. The installation of an inclined or horizontal AGI well would, in effect, result in the emplacement of a high pressure gas line (the injection well tubing) beneath a public highway, which is inherently riskier than the low pressure pipeline proposed by DEFS.
3. Geologic structures exist between the Linam Ranch Plant and the target Lower Bone Springs and Brushy Canyon Formations in the SW ¼, Sec. 30, T18S, R37E that would complicate drilling, testing, and successful logging and completion of an inclined or

horizontal well, resulting in significantly increased drilling risks and tremendously increased costs.

For all of these reasons, and primarily due to the decreased reliability and unknown effectiveness of inclined or horizontal wells for AGI, I specifically recommended that a vertical well be installed to reach the target Lower Bone Springs and Brushy Canyon Formations in the SW ¼, Sec. 30, T18S, R37E. DEFS has already obtained a long-term easement from the New Mexico State Land Office for the proposed locations for the well, pipeline, and surface facilities. While I concur with Mr. Jones' testimony at the hearing on March 13, 2006, that significant advances have been made in the ability to drill inclined and horizontal wells for hydrocarbon production, these technologies are simply not proven and have not been used in the installation of AGI wells.

Following Mr. Jones' testimony, I have reviewed information on over 90 AGI projects in North America (approximately 67% in Canada and 33% in the U.S.) and have not found a single AGI well completed in an inclined or horizontal borehole. Furthermore, I have consulted with other experts in the installation of horizontal and inclined wells who have indicated that (despite substantially higher costs than vertical wells) the reliability and likelihood of successful completion of horizontal or inclined wells for AGI purposes are substantially lower than those of a vertical well, especially in areas where geologic structures, such as faults or joints, must be traversed. It is because of this significantly higher drilling and completion risk and failure in horizontal or inclined boreholes, that, as a Certified Professional Geologist, I have specifically recommended that DEFS avoid the installation of an inclined or horizontal AGI well at the Linam Ranch site.

I have also conducted a detailed review of the conditions included in Attachment C to the OCD's expert testimony and I have recommended to DEFS that they concur and comply with OCD's recommendations included in Attachment C. In addition, I provided this testimony to OCC at the hearing of March 13, 2006, and DEFS has stipulated at the hearing that they would concur and would comply with OCD's recommendations contained in Attachment C.

In contrast, however, I would urge the OCC to disregard any further evaluation of a horizontal or inclined borehole for an AGI well at Linam Ranch because of its inherently higher drilling and operational risk, increased likelihood of failure, and reduced ability to assure protection of human health and the environment.

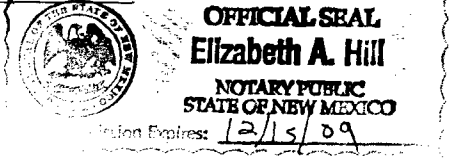
FURTHER AFFIANT SAYETH NOT.

Alberto A. Gutiérrez, C.P.G.

SUBSCRIBED AND SWORN before me on this 15th day of March 2006.

Notary Public

My Commission Expires: 12/15/09



PROPOSED-DRAFT

H_2S Contingency Plan

Acid Gas Injection Facility
Linam Ranch Gas Plant

Hobbs, New Mexico

March 2006

EXHIBIT B

H_2S Contingency Plan

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Duke Energy®
Field Services

Duke Energy Field Services
Acid Gas Injection Facility
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PROPSED/DRAFT PLAN

I. INTRODUCTION

Duke Energy Field Services, L.P. conducts its business responsibly by providing employees and any other person working or visiting, a safe work place. The Acid Gas Injection Facility - Linam Ranch Gas Plant Hydrogen Sulfide Contingency Plan was developed to satisfy the Oil and Conservation District Rule 118; and paragraph 7.6 of the guidelines published by the API in its publication entitled "Recommended Practices for Oil and Gas Producing and Gas Processing Plant Operations Involving Hydrogen Sulfide," RP-55.

This plan provides guidelines to assist in responding to and managing an emergency in the event of an H_2S release from a pipeline or facility. The goals of this plan are to provide tools to enable an efficient, coordinated and effective response to emergencies. This plan contains written guidelines to evaluate and respond to an incident, and to prevent or minimize personal injury or loss, to avoid environmental hazards, and to reduce damage to personal property.

II. DEFINITIONS USED IN THIS PLAN

ANSI The acronym "ANSI" means the American National Standards Institute.

API The acronym "API" means the American Petroleum Institute.

Area of Exposure (AOE) The phrase "area of exposure" means the area within a circle constructed with a point of escape at its center and the radius of exposure as its radius.

ASTM The acronym "ASTM" means the American Society for Testing and Materials.

Dispersion Technique A "dispersion technique" is a mathematical representation of the physical and chemical transportation characteristics, dilution characteristics and transformation characteristics of hydrogen sulfide gas in the atmosphere.

Escape Rate The "escape rate" is the maximum volume (Q) that is used to designate the possible rate of escape of a gaseous mixture containing hydrogen sulfide, as set forth herein.

(a) For existing gas facilities or operations, the escape rate shall be calculated using the maximum daily rate of the gaseous mixture produced or handled or the best estimate thereof. For an existing gas well, the escape rate shall be calculated using the current daily absolute open flow rate against atmospheric pressure or the best estimate of that rate.

(b) For new gas operations or facilities, the escape rate shall be calculated as the maximum anticipated flow rate through the system. For a new gas well, the escape rate shall be calculated using the maximum open flow rate of offset wells in the pool or reservoir, or the pool or reservoir average of maximum open flow rates.

(c) For facilities or operations not mentioned, the escape rate shall be calculated using the actual flow of the gaseous mixture through the system or the best estimate thereof.

GPA The acronym "GPA" means the Gas Processors Association.

LEPC The acronym "LEPC" means the Local Emergency Planning Committee established pursuant to the Emergency Planning and Community Right-to-Know Act, 42 U.S.C. Section 11001.

NACE The acronym "NACE" means the National Association of Corrosion Engineers.

PPM The acronym "ppm" means "parts per million" by volume.

PHV Potentially Hazardous Volume means the volume of hydrogen sulfide gas of such concentration that:

(a) the 100-ppm radius of exposure includes any public area;

(b) the 500-ppm radius of exposure includes any public road; or

(c) the 100-ppm radius of exposure exceeds 3,000 feet.

Public Area A "public area" is any building or structure that is not associated with the well, facility or operation for which the radius of exposure is being calculated and that is used as a dwelling, office, place of business, church, school, hospital, or government building, or any portion of a park, city, town, village or designated school bus stop or other similar area where members of the public may reasonably be expected to be present.

Public Road A "public road" is any federal, state, municipal or county road or highway.

Radius of Exposure The radius of exposure is that radius constructed with the point of escape as its starting point and its length calculated using the following Pasquill-Gifford derived equation, or by such other method as may be approved by the division:

(a) For determining the 100-ppm radius of exposure: $X = [(1.589)(\text{hydrogen sulfide concentration})(Q)]^{(0.6258)}$, where "X" is the radius of exposure in feet, the "hydrogen sulfide concentration" is the decimal equivalent of the mole or volume fraction of hydrogen sulfide in the gaseous mixture, and "Q" is the escape rate expressed in cubic feet per day (corrected for standard conditions of 14.73 psia and 60 degrees F).

(b) For determining the 500-ppm radius of exposure: $X=[(0.4546)(\text{hydrogen sulfide concentration})(Q)]^{(0.6258)}$, where "X" is the radius of exposure in feet, the "hydrogen sulfide concentration" is the decimal equivalent of the mole or volume fraction of hydrogen sulfide in the gaseous mixture, and "Q" is the escape rate expressed in cubic feet per day (corrected for standard conditions of 14.73 psia and 60 degrees F).

Regulatory Threshold

(1) Determination of Hydrogen Sulfide Concentration.

(a) Each person, operator or facility shall determine the hydrogen sulfide concentration in the gaseous mixture within each of its wells, facilities or operations either by testing (using a sample from each well, facility or operation), testing a representative sample, or using process knowledge in lieu of testing. If a representative sample or process knowledge is used, the concentration derived from the representative sample or process knowledge must be reasonably representative of the hydrogen sulfide concentration within the well, facility or operation.

(b) The tests used to make the determination referred to in the previous subparagraph shall be conducted in accordance with applicable ASTM or GPA standards or by another method approved by the division.

(c) If a test was conducted prior to the effective date of this section that otherwise meets the requirements of the previous subparagraphs, new testing shall not be required.

(d) If any change or alteration may materially increase the concentration of hydrogen sulfide in a well, facility or operation, a new determination shall be required in accordance with this section.

(2) Concentrations Determined to be Below 100 ppm. If the concentration of hydrogen sulfide in a given well, facility or operation is less than 100 ppm, no further actions shall be required pursuant to this section.

(3) Concentrations Determined to be Above 100 ppm.

(a) If the concentration of hydrogen sulfide in a given well, facility or operation is determined to be 100 ppm or greater, then the person, operator or facility must calculate the radius of exposure and comply with applicable requirements of this section.

(b) If calculation of the radius of exposure reveals that a potentially hazardous volume is present, the results of the determination of the hydrogen sulfide concentration and the calculation of the radius of exposure shall be provided to the division. For a well, facility or operation existing on the effective date of this section, the determination, calculation and submission required herein shall be accomplished within 180 days of the effective date of this section; for any well, facility or operation that commences operations after the effective date of this section, the determination, calculation and submission required herein shall be accomplished before operations begin.

(4) Recalculation. The person, operator or facility shall calculate the radius of exposure if the hydrogen sulfide concentration in a well, facility or operation increases to 100 ppm or greater. The person, operator or facility shall also recalculate the radius of exposure if the actual volume fraction of hydrogen sulfide increases by a factor of twenty-five percent in a well, facility or operation that previously had a hydrogen sulfide concentration of 100 ppm or greater. If calculation or recalculation of the radius of exposure reveals that a potentially hazardous volume is present, the results shall be provided to the division within sixty (60) days.

III. CHARACTERISTICS OF HYDROGEN SULFIDE (H_2S) AND SULFUR DIOXIDE (SO_2)

Hazards of Hydrogen Sulfide

At normal atmospheric conditions, hydrogen sulfide (H_2S) is a colorless gas. It is commonly referred to by other names such as Rotten Egg Gas, Acid Gas, Sour Gas, Sewer Gas, Poison Gas and Sulfur Gas. It has a characteristic "rotten egg" smell at low concentrations. At higher concentrations, it has a sweet odor. At still higher concentrations, an odor cannot be detected at all due to olfactory nerve anesthesia. Odor must *not* be used as means of determining the concentration of H_2S gas! Hydrogen sulfide can form explosive mixtures at concentrations between 4.3% and 46%, by volume. Its auto-ignition temperature is 500 degrees F (260 degrees C). When burning, its flame is practically invisible. It is denser than air (1.19 times heavier than air) and may accumulate in low places. Hydrogen sulfide gas tends to interact with high carbon steel, causing embitterment and fine fractures in metal components and piping.

H_2S acts as a chemical asphyxiate, preventing the body from utilizing oxygen in the tissue. Breathing may stop after a few seconds of exposure to H_2S gas in concentrations of 600-700 ppm. This produces symptoms such as panting, pallor, cramps, dilation of eye pupils and loss of speech. This is generally followed by immediate loss of consciousness. Death may occur quickly from respiratory paralysis and cardiac arrest. The table below illustrates the physical effects of hydrogen sulfide on a healthy adult.

Table 1 Effect of exposure to Hydrogen Sulfide Gas on a Healthy Adult

Concentration			Physical Effects
percent (%)	ppm	grains per ft^3	
0.001	10	0.65	Obvious and unpleasant odor. Safe for 8 hours exposure.
0.01	100	6.48	Kills smell in 3 to 15 minutes; may sting eyes and throat.
0.02	200	12.96	Kills smell shortly; stings eyes and throat. IDLH
0.05	500	32.96	Dizziness; breathing ceases in a few minutes; artificial respiration / oxygen must be given promptly.
0.07	**700**	45.36	**Unconscious quickly; death will result if not rescued promptly.**
0.10	**1000**	64.80	**Unconscious at once; followed by death within minutes.**

Properties of H_2S

COLOR	Colorless.
ODOR	Very offensive, commonly referred to as the odor of rotten eggs.
VAPOR DENSITY	1.189 (Air=1.0) H_2S is heavier than air.
BOILING POINT	-76 degrees F (-24 degrees C).
EXPLOSIVE LIMITS	4.3 to 46% by volume in air.
IGNITION TEMPERATURE	500 degrees F (260 degrees C).
WATER SOLUBLE	Yes (4 volumes gas in 1 volume water at 32 degrees F (0 degrees C).
FLAMMABILITY CORROSIVE	Forms explosive mixtures with air or oxygen.

Toxicity Table – H_2S

1 ppm = .0001% (1/10,000 of 1%)	Can smell (rotten egg odor).
10 ppm = .001% (1/1000 OF 1%)	Allowable for 8 hours exposure. (PEL & TLV)
100 ppm = .01% (1/100 of 1%)	Kills smell in 3-15 minutes. May burn eyes and throat. Considered to be IDLH atmosphere (Immediately Dangerous to Life and Health).
200 ppm = .03% (2/100 of 1%)	Kills smell rapidly. Burns eyes and throat.
500 ppm = .05% (5/100 of 1%)	Loses sense of reasoning and balance. Respiratory disturbances in 2-15 minutes. Needs prompt artificial resuscitation.
700 ppm = .07% (7/100 of 1%)	Will become unconscious quickly. Breathing will stop and death will result if not rescued promptly. Immediate artificial resuscitation is required.
1000 ppm = .1% (1/10 OF 1%)	Unconscious at once. PERMANENT BRAIN DAMAGE MAY RESULT UNLESS RESCUED PROMPTLY.
	ppm=parts of gas per million parts of air by volume. 1% = 10,000 ppm.

Properties of Sulfur Dioxide SO_2

Sulfur Dioxide - SO_2	Physical and Chemical Properties
Chemical Formula	SO_2
Molecular Weight	64
Boiling Point	14 degrees Fahrenheit
Non-Combustible	Produced by burning of H_2S Gas
Vapor Pressure	>1 atm @ 68 degrees Fahrenheit
Melting Point	-104 degrees Fahrenheit
Specific Gravity	Heavier than air, 2.26 degrees gravity
Colorless gas	SO_2 is colorless gas, very irritating to the eyes and lungs
Odor	Pungent odor and can cause injury or death to persons exposed to it
Reactions	Reacts with water or steam to produce toxic and corrosive gases
Hazards of Sulfur Dioxide	
Toxicity	The physiological effects on humans when inhalation of SO_2 occurs, varies at different levels of concentration and may be as follows
Concentrations SO_2	Physiological Effects SO_2
0.3-1 ppm	Detection level – pungent odor
2 ppm	Threshold Limit Value (TLV) Time Weighted Average (TWA)
5 ppm	15 minute Short Term Exposure Limit (STEL) permitted by OSHA
6 – 12 ppm	Irritation of the throat and nose
20 ppm	Eye irritation
100 ppm	Immediately Dangerous to Life or Health (IDLH) set by NIOSH

IV. EMERGENCY RESPONSE POLICY AND AUTHORITY

It is the policy of DEFS to take the necessary actions required to safeguard DEFS personnel and the public from emergency incidents. Such emergency incidents may include fires, hazardous materials releases, and incidents resulting from natural hazards such as tornadoes.

In the event of an emergency incident, DEFS personnel will take prompt action within their immediate work area to ensure that all appropriate DEFS personnel, corporate personnel, and the public are alerted or notified that an emergency incident exists.

Whenever possible, DEFS personnel will take immediate action to limit the effects of the emergency. Four objectives will be considered when developing an appropriate emergency response. These objectives are:

- Life safety.
- Environmental protection.
- Protection of company and public property.
- Preventing interruption of business and public services such as highway access, water, and utilities.

While all four of the above objectives are important, life safety will always remain the first and highest priority.

All DEFS personnel have the responsibility, if necessary, to immediately alert other DEFS personnel that an emergency condition exists and to take appropriate action to protect life, property, and the environment. All emergency response actions by DEFS personnel are voluntary. Emergency response actions taken by individuals should be within the limitations of their training, experience, and physical abilities. At no time will Linam Ranch Plant personnel assume an unreasonable risk during an emergency response. An unreasonable risk exists when:

- The task exceeds the physical abilities of the individual.
- The individual is not properly trained to complete the task.
- The individual does not have adequate experience to complete the task.

V. RESPONSE PROCEDURES FOR UNINTENTIONAL (ACCIDENTAL) RELEASES

If an H_2S leak is detected as a result of an accidental release, the following emergency plan of action should be put into effect to adequately ensure the safety of DEFS employees, contractors and the public. These response sequences should be altered to fit the prevailing situation and event/site-specific requirements.

1. Upon detecting a leak, immediately move away from the source and attempt to get out of the affected area by moving upwind, or cross wind if travel upwind is not possible.

2. Alert other personnel in the area. Assist personnel in distress if this can be done without endangering yourself. Proceed to the designated emergency assembly area.

3. If injury or death has occurred, immediately call emergency services (911).

4. If possible, take immediate measures to control present or potential discharge and to eliminate possible ignition sources.

5. Notify the supervisory foreman. Upon arriving at the scene, the supervisor should formally assume the role of the Incident Commander (IC). Until relieved by the supervisor, the senior employee having initially discovered the leak should fill the role of IC.

6. The IC will assess the situation and direct further actions to be taken. If assistance is required from law enforcement, safety or medical agencies, consult the emergency services telephone listing under Section XIII. The Division Operations Vice-President or his designee should also be notified.

7. If the IC deems it necessary, ensure that steps are taken to stop traffic through the area, most importantly, highway traffic. Roadblocks must be set up at the 10-ppm H_2S boundary. The H_2S boundary shall be delineated by using a calibrated H_2S monitor. Call emergency services (911) for assistance in quarantining the area, if needed. Refer to maps in Section XVII for highway and pipeline locations.

8. Initiate evacuation of nearby residents, if deemed necessary. Coordinate with emergency services.

9. Personnel equipped with self-contained breathing apparatus (SCBA) and portable H_2S monitoring equipment will determine the cause and extent of the leak. Personnel should enter the area from upwind of the site. If a reading of 10 ppm or higher of H_2S is obtained, then backup personnel equipped with SCBA will also be required.

10. No one will be intentionally exposed to H_2S concentrations in excess of 10 ppm without proper Personal Protection Equipment (PPE), IC authorization and backup personnel.

11. If possible, de-energize all sources of ignition, using lockout/tagout procedures.

12. If possible, perform shutdown on appropriate equipment and systems.

13. Trained personnel will continuously monitor H_2S concentrations, wind direction and area of exposure and will advise public safety and emergency personnel on current conditions.

14. Protective measures shall be maintained until the threat of injury from H_2S poisoning has been eliminated. The area must be checked with monitoring equipment and cleared below 10 ppm before allowing entry without proper PPE.

15. Notify the Division Health & Safety Manager. Assistance will be provided to ensure all proper notifications and reporting are made to local, state and federal agencies.

16. As soon as possible, **but no more than four hours after plan activation,** notify the New Mexico Oil Conservation Division – Lea County (See Section XIII). At a minimum, the following information will be needed:

    - The company name.
    - Facility name.
    - Your name and telephone number for them to contact you.
    - The location and source of the discharge.
    - A description of the area affected by the discharge, the probable concentration of H_2S in the region and the wind direction/velocity.
    - If necessary, request additional assistance from the agency.

VI. EMERGENCY INCIDENT MANAGEMENT

Emergency incident management will follow the Incident Command System (ICS) as described by the Federal Emergency Management Act (FEMA). The intent of using ICS for all emergency incidents provides automatic continuity with outside agencies and assists in establishing a "unified command" of the incident. Duke Energy provides instruction and training on the ICS, which is beyond the scope of this contingency plan. However a brief overview of the system is provided below.

The Incident Command System (ICS) utilizes a flexible, modular approach to organizing resources to effectively respond to emergency events. FEMA suggests that the basic Incident Command System has five functional areas:

- Command;
- Operations;
- Planning;
- Logistics; and,
- Finance.

However, for incidents such as those described in this plan, it seems more likely that the basic Incident Command System would be comprised of: 1) Command; 2) Operations Chief; and, 3) Safety Officer. Larger incidents may require additional positions such as Public Information Officer, Logistics Chief, Planning Chief, Finance Chief, Staging Manager, Medical Group Supervisor and Environmental Group Supervisor. The exact number and combination of positions will vary depending upon the type, size and duration of the incident.

In every incident, command must first be established. The first person to discover the problem is, by default, the Incident Commander (IC) until this responsibility is transferred to someone else. This responsibility should be formally transferred to the Facility/Field Supervisor as soon as practical. Who is acting as the IC should be clear and apparent at all times.

The Incident Commander (IC) is responsible for the overall management of the incident. Where the IC does not delegate or assign a position, the IC retains that responsibility. The IC should be careful to have no more than 5 to 8 people reporting directly to him. The IC establishes the strategy and goals for the incident and is ultimately responsible for the safety and success of the response activities.

An Operations Chief (OPS) is responsible for implementing the strategy to accomplish the goals defined by the IC. OPS directs all tactical operations, oversees response personnel and may assist the IC in the development of the action plan.

The Safety Officer is assigned by and reports directly to the IC. This position is responsible for identifying hazardous or unsafe situations, and developing measures necessary to assure the safety of response personnel and any victims of the incident. He/she should ensure that any personnel responding to the incident are using the proper PPE and have adequate training. The Safety Officer has the authority and responsibility to terminate or suspend operations that he believes are unsafe or will place people in imminent danger.

VII. PERSONNEL VEHICLES AND EQUIPMENT

Plant personnel are equipped with personal H_2S monitors and portable gas detection devices.

The plant has a fully equipped mobile breathing air system with work units. Also, there are self contained breathing apparatus (SCBA's) located strategically throughout the facility.

An Emergency Response Kit and Road Block Kits are located at the egress stations for easy access if the facility is evacuated.

Personnel have both cellular and mobile phones for communication, as well as two-way radios for inter-company communication.

Each mechanic or field truck is equipped with a Self Contained Breathing Apparatus (SCBA).

All DEFS personnel are equipped with personal H_2S monitors and portable gas detection devices.

Communications to DEFS field personnel is via mobile cellular telephones or two-way radios.

Each DEFS field truck is also equipped with a fire extinguisher in order to enable assistance as needed.

Company vehicles are equipped with emergency breathing air units, two-way radios, roadblock kits and mobile phones.

VIII. EVACUATION PROCEDURE

Evacuation may become necessary to protect personnel and the public from hazards associated with an incident. Orderly evacuation is essential to protect the general public as well as DEFS personnel and property.

DEFS personnel have reviewed the affected area for this plan and have determined the safe evacuation routes and assembly areas to reduce confusion if evacuation becomes necessary. The DEFS Facility/Field Operator may assign runners to direct evacuation and account for personnel during emergencies. (See Section XIV for evacuation routes).

Designated Assembly Areas shall be at a safe distance from the incident in an appropriate direction (upwind, upstream, and upgrade). If the Assembly Areas do not provide adequate shelter, transportation to a central shelter should be arranged after all personnel are accounted for. As the incident progresses, the IC must continuously evaluate the adequacy of the assembly area and necessity of the shelter.

DEFS personnel evacuating their work areas should evacuate the facility and initiate the plant ESD system, and proceed to the Designated Assembly Area. Facility personnel will account for all personnel, ensure the evacuated area is secured and report the status of the evacuation to the IC. Evacuated personnel shall remain at the assembly area or shelter until directed otherwise by the IC.

- Local law enforcement and/or emergency management authority must be notified in conjunction with any community evacuation or public protective measures initiated.
- Emergency Response Plan initiated.
- Assess the scene; protect yourself.
- Summon EMS to the scene; provide information on the nature and number of injuries.
- If trained, provide First Aid/CPR as necessary, until EMS arrives at the scene; injured personnel should not be moved unless the situation is life threatening.
- Evacuate unnecessary personnel from the area.
- Establish a secure perimeter around the area to prevent unauthorized entry.
- Initiate the site security plan.
- Notify Facility/Field Supervisor and make appropriate notifications to local Fire and EMS.
- Make other internal management contact as appropriate.

In case of a fatality:

- Do not move the victim.
- Do not release name of victim(s).
- Contact local law enforcement.
- Contact local medical examiner.
- Preserve the accident site.
- Restrict all radio communications concerning the incident.

Make appropriate government agency notification and conduct post-incident activities.

IX. COORDINATION WITH STATE EMERGENCY PLANS

The Hydrogen Sulfide Contingency Plan as described will be coordinated with the New Mexico Oil Conservation Division (NMOCD) and with the New Mexico State Police consistent with the New Mexico Hazardous Materials Emergency Response Plan (HMER). A copy of this plan will be submitted to the New Mexico State Police and Local Emergency Planning Committee for Eddy County.

LEPC
505-393-6161

NEW MEXICO STATE POLICE
505-392-5588

LEA COUNTY SHERIFF'S OFFICE
505-396-3611

STATE EMERGENCY RESPONSE COMMISSION (SERC)
(505) 393-6161

NEW MEXICO OFFICE OF EMERGENCY MANAGEMENT
(505) 476-9600

X. NOTIFICATION OF THE OIL CONSERVATION DIVISION

The person, operator or facility shall notify the New Mexico Oil Conservation Division (NMOCD) upon a release of hydrogen sulfide requiring activation of the Hydrogen Sulfide Contingency Plan as soon as possible, but no more than four hours after plan activation, recognizing that a prompt response should supercede notification. The person, operator or facility shall submit a full report of the incident to the NMOCD on Form C-141 no later than fifteen (15) days following the release.

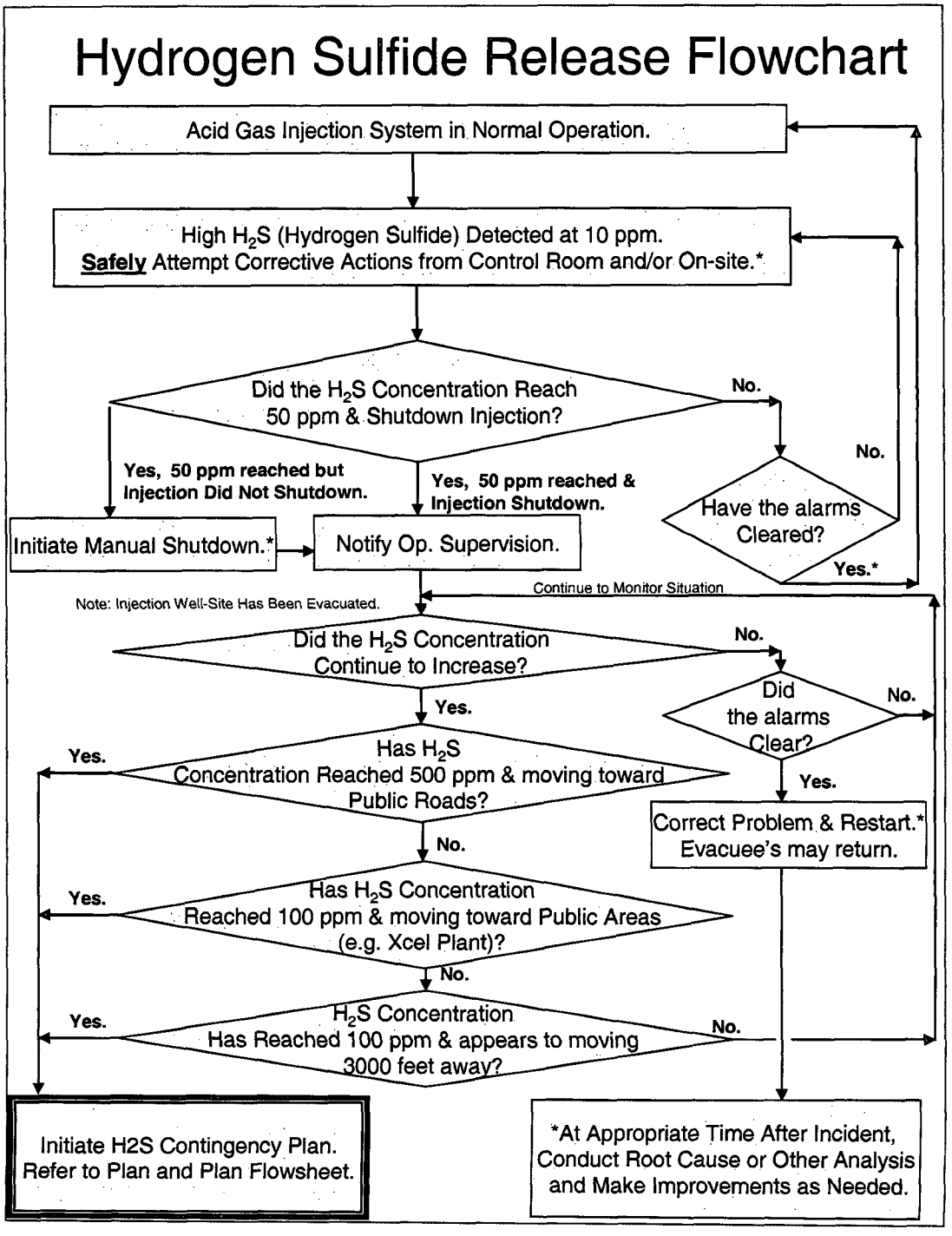
OIL CONSERVATION DIVISION
LEA COUNTY

505-393-6161

XI. PLAN ACTIVATION

The Hydrogen Sulfide Contingency Plan shall be activated when the Incident Commander (IC) believes that a release creates a concentration of hydrogen sulfide that exceeds or is likely to exceed the following activation levels:

- 100 ppm in any defined public area;
- 500 ppm at any public road; or
- 100 ppm at a distance greater than 3000 feet from the site of the release.



XII. TRAINING AND DRILLS

Training for all affected DEFS personnel will be conducted prior to completion of the project and introduction of product. Training will then be given as needed for any personnel who may later be affected by this project.

This training will include:

- Training on the responsibilities and duties of essential DEFS personnel.
- On-site or classroom tabletop drills which simulate a release or other situation affecting the facility.
- Annual H_2S Hazard Training.

Initial training is to take place upon employment with the company and refresher training is to be conducted annually – or sooner if there is a change in the plan or the need for training is determined.

All training will be documented and training records will be maintained on file at the Linam Ranch Gas Plant.

All drills will be evaluated and documented including any recommendations resulting from findings. Recommendations will be assigned to DEFS personnel for completion by an established date. Upon completion, the action plan will be documented and records will be filed at the Linam Ranch Gas Plant.

Only trained and certified personnel from responding agencies will participate in any rescue exercise.

The Hydrogen Sulfide Contingency Plan will also provide for training of noted residents in this plan as appropriate on the proper protective measures to be taken in the event of a release, and shall provide for briefing of public officials on issues such as evacuation or shelter-in-place plans. Literature will be passed out to the noted residents with emergency numbers to be utilized in the event of an incident associated with this or any DEFS equipment and/or piping.

XIII. EMERGENCY DEFS CONTACT PHONE NUMBERS

Use the following phone number in the event of a catastrophic release and/or emergency situation on the pipeline.

Telephone Numbers of DEFS Personnel

24 HOUR TELEPHONE NUMBER 800-435-1679

Then Call:

Work Group Supervisor	Home #	Cell #
Eunice Gas Plant Kevin Gerber	(505) 390-2710	(505) 390-3728
Linam Gas Plant Buddy Holt	(505) 370-7140	(505) 390-5426
Construction & Maintenance Department Mark Owens	(505) 396-3937	(505) 390-3008

Then Call:

Asset Manager Tony Lee	(505) 392-0146	(505) 706-0146
Asset Safety Coordinator Sandy Ballard	(505) 785-2020	(505) 390-6064
Asset Engineer Kelly Jamerson	(432) 699-7376	(325) 226-3357

Remember – Our 4 Objectives in an Emergency Are:

1. **Life Safety.**
2. **Environmental Protection.**
3. **Protection of Company and Public Property.**
4. **Preventing interruption of business and public services such as Highway Access, Water & Utilities.**

Life Safety Will Always Remain the First and Highest Priority!

In case of an emergency in the Artesia/Carlsbad Asset requiring assistance for fire, ambulance, medical authorities or HazMat issues – immediately call:

911

Responder Emergency Numbers:

Facility	Eunice, New Mexico	Hobbs, New Mexico
Fire Department	911	911
Medical Facility	505-492-5000	505-492-5000
State Police	505-392-5588	
Sheriff Department	505-396-3611	
LEPC		

Telephone Numbers of Public Agencies

Oil Conservation Division – Lea County	505-393-6161
State Emergency Response Commission (SERC)	505-393-6161
New Mexico Office of Emergency Management	505-476-9600
Bureau of Land Management - Hobbs	505-392-8736

Telephone Numbers of Emergency Resources

Organization	Phone Number
Spill – Cleanup Contractors	
Rusty Forest – Hobbs (Roustabout)	505-397-7186 - Office 505-369-9114 - Mobile 505-370-7631 - Pager
Heavy Equipment Contractors	
B&H Construction – Eunice	505-394-2588
Rusty Forest – Hobbs (Roustabout)	505-397-7186 - Office 505-369-9114 - Mobile 505-370-7631 - Pager
Smith & Sons - Hobbs	505-397-1852
Sullivan Crane - Hobbs	505-393-7141
Sweatt Construction - Hobbs	505-397-4541
Transportation Services	
McClaskey Oil Field Service	505-393-1016
Pool Company of Texas	505-392-2577
Scurlock Permian	505-392-8212
Other	
Callaway Safety	505-392-2973
Indian Fire and Safety	505-393-3093
Artesia Fire & Safety	505-420-7876
Southwestern Public Service	800-750-2520

XIV. DETAIL INFORMATION - POTENTIALLY HAZARDOUS AREAS

No. 1. AGI Pipeline Inlet and Linam Ranch Plant

DRIVING DIRECTIONS:
From Hobbs: Take Highway US 62/180 west seven miles. Linam Ranch Plant and Inlet to the Acid Gas Pipeline is on the left (south) side of the highway.
Location: NW ¼ S-6T17S-R37E, Lea County
Latitude: 32:41:76.1
Longitude: -102:1728.4

No. 2. AGI Pipeline Outlet and AGI Well-Site

To the Proposed Acid Gas Injection Facility: Proceed an additional mile west on Highway US 62/180 from the Linam Ranch Plant. Turn north on the Maddox Plant Road (County Highway 41) and proceed 1.25 miles north. Turn left on the Acid Gas Injection Facility road and proceed about 0.25 miles east to the proposed site.
Location: NW ¼ S-30 T18S-R37E, Lea County
Latitude: 32:43:00.7
Longitude: -103:17:33.8

EVACUATION ROUTE:

At all times note the wind direction before evacuating procedures begin.

Evacuation for all persons inside of the AGI Facility fences would be west to the Maddox Plant Road (wind conditions permitting). Then, proceed south of the facility as a group to account for all persons.

ROAD BLOCKS:

In emergencies involving a large acid gas pipeline leak near the Linam Ranch Plant (Area 1 - pipeline inlet) US Highway 62/180 will be blocked at approximately one mile east and west of the plant. Maddox Road will be blocked at approximately one mile north and one mile south of the plant.

For most emergencies involving the Acid Gas Compressor Site (Area 2) Maddox Road will be blocked about ¼ mile north of US 62/180 and the rancher's road will be blocked northeast of the well-site. The Maddox Plant Road may also be blocked at the Maddox Lake if persons are in this area.

COMMAND POST:

The Command Post will be established at one of the roadblock locations. The site will be dependent of the wind direction.

The Incident Commander, after arriving at the scene, has the authority to assess the situation and determine the severity level of the incident. The Incident Commander may determine that the Contingency Plan as written cannot be activated effectively. The Emergency Response Plan may then be activated depending on the Incident Commander's evaluation of the situation.

PUBLIC RECEPTORS LOCATED INSIDE RADIUS OF EXPOSURE (ROE):

Area 1: There are residential public receptors located in the ROE for Acid Gas Injection at the Linam Ranch Gas Plant. The receptors listed include those within the ROE of the acid gas pipeline from the Linam Ranch Plant to the Acid Gas Injection Facility. US Highway 62/180 runs directly east and west to the south of the facility. This is a highly traveled road and would need to be blocked as stated.

	RESIDENT'S NAME	EMERGENCY TELEPHONE NUMBER	RESIDENT'S ADDRESS
1.	Bill Carlin	505-393-2766	9800 W. Carlsbad Hwy., Hobbs, NM
2.	L.S. Webber	505-393-4784	9801 W. Carlsbad Hwy., Hobbs, NM
3.	Joe Handley (Located on border of ROE)	505-397-6546	9201 W. Carlsbad Hwy., Hobbs, NM
4.	DEFS _ Linam AGI Well-Site (Located on border of ROE)	TBD	
5.	DEFS – Hobbs Plant	505-393-5826	
6.	Maddox Station (Located of border of ROE)	505-391-3406 – Control Room 505-393-5717 – Control Room 800-895-1999 (24 Hr. Emergency #)	
7.	Maddox Lake (Located on border of ROE)	No Number – Notify Maddox Station	

Area 2: There are residential public receptors located in the ROE for Acid Gas Injection Well-Site. The receptors listed include those within the ROE of the acid gas pipeline from the Linam Ranch Plant to the Acid Gas Injection Facility. US Highway 62/180 runs directly east and west to the south of the facility. This is a highly traveled road and might need to be blocked as stated. Depending on the incident County Road 41 (Maddox Road) might be blocked instead.

	RESIDENT'S NAME	EMERGENCY TELEPHONE NUMBER	RESIDENT'S ADDRESS
1.	Randy & Naomi Smith	505-885-9011 505-361-1512 (cell)	NNE of Maddox Road Hobbs NM (Sec18, 18S,37E)
2.	Others – TBD Inside ROE)	TBD	
3.	DEFS – Linam Ranch Plant (Located of border of ROE)	Plant Operator to sound alarm for evacuation as required.	
4.	DEFS – Hobbs Plant	505-393-5826	
5.	Maddox Station	505-391-3406 – Control Room 505-393-5717 – Control Room 800-895-1999 (24 Hr. Emergency #)	
6.	Maddox Lake	No Number – Notify Maddox Station	

If a significant leak occurs along the acid gas pipeline route between the Linam Ranch Plant and the Well-Site consideration should be given to notifying those on both lists for Area 1 and Area 2.

XV. DEFS PUBLIC AWARENESS PROGRAM

Duke Energy Field Services (DEFS) participates in an extensive annual Public Awareness Program and Damage Prevention Program.

DEFS participates with the Local Emergency Planning Committee to educate persons residing in Lea County about the hazards associated with gas gathering pipelines.

DEFS participates with the Pipeline Group to educate Excavators and Contractors about Damage Prevention to underground facilities and is a member company of the New Mexico One-Call System.

DEFS installs pipeline markers and signs at all facilities and road crossings to identify our underground pipelines and maintains these markers on an annual schedule.

Residents living within a ¼ mile radius of all DEFS pipelines receive a Public Awareness brochure that explains Duke's Public Awareness and Damage Prevention program. This brochure is printed in both English and Spanish. It contains visual documentation of pipeline markers, aerial markers and casing vent markers Residents are encouraged to report any damage or vandalism to these markers in their neighborhood. This brochure also educates the public on how to respond to a pipeline emergency and includes a 24 hour/7 day week emergency telephone number.

DEFS PUBLIC AWARENESS BROCHURES WILL BE PRESENTED TO EACH RESIDENT LIVING WITHIN THE RADIUS OF EXPOSURE.

XVI. EMERGENCY SHUTDOWN EQUIPMENT

Duke Energy Field Services (DEFS) has an installed automatic and manually activated emergency shutdown system (ESD) at the Acid Gas Injection Facility at the Linam Ranch Gas Plant. The plant operator and/or Incident Commander (IC) may use these systems to shutdown and isolate the equipment in the facility. This is a fail safe system that will shut valves and equipment if any portion of the system fails. The Acid Gas Injection system will be normally controlled from the Linam Ranch Plant Control Room and shutdown of equipment and ESD valves at the well-site may be accomplished from this system as well as at the well-site.

When activated the ESD shuts an automatic valve on the inlet acid gas feed stream, shuts an automatic valve on the compressed acid gas to the acid gas injection well, and sends a signal to the wellhead panel to shut down automatic valves on the wellhead. The major equipment is shutdown. The specific major equipment items at injection well site that are shutdown in an ESD include the acid gas compressors and associated coolers and pumps. The fuel gas, which is used for flare fuel and purge gas is left on-line; however an automatic valve is provided in this line at the well-site that can be actuated separately in the control system to close this valve.

In the wellhead control panel there is a separate shutdown for the subsurface safety valve (SSSV). The SSSV can be closed if required. The SSSV will close automatically upon detection of high pressure in the wellhead piping. The SSSV will shut if there is a fault in the wellhead control panel.

In addition to these systems the well-site facility contains portable fire extinguishers that may be used in an emergency. The well-site facility also has air packs used for escape or rescue located throughout the facility at key locations. The facility also has a breathing air system at the compressor units consisting of air bottles, tubing, and a manifold to connect 5 minute air packs. These are primarily used when performing maintenance work on the compressor units; however, the can also be used during an emergency if required. Refer to the "Emergency Equipment Location Plan" for the location of this equipment.

DEFS has also installed hydrogen sulfide detectors throughout the Well-Site Facility in key locations to detect possible leaks. Upon detection of hydrogen sulfide at 10 ppm levels at any detector a visible beacon is activated at that detector and an alarm is sounded. Upon detection of hydrogen sulfide at 50 ppm levels at any detector, an evacuation alarm is sounded throughout the Facility. All personnel proceed immediately to a designated area near the Facility office outside the fence (or alternate area south of the plant depending on wind direction and their location in the well-site facility).

In addition to sounding evacuation alarm sirens, at concentrations of 50 ppm in the acid gas compressor area the acid gas compressor is shutdown and isolation valves upstream and downstream of the unit are closed, including the wellhead automatic wing valve. Refer to the "Plant H2S Alarm System Location Plan" for the locations of the hydrogen sulfide detectors.

In the Final Design other options will be considered for implementation of an automatic notification of the Excel - Maddox Plant if the H2S Contingency Plan is activated for the AGI Well-Site (Area 2). This is due to the proximity of the Excel Plant to the Well Site. These options could include an automatic phone call-out system, a transmitted signal that the contingency plan has been invoked, and/or a hard-wired signal that the plan has been invoked or that a shutdown due to high hydrogen sulfide concentration has occurred. The preferred option would be that the signal be directly linked to the Excel Plant control/alarm system so that alarms will sound throughout the Maddox Plant to notify the operator(s)

EMERGENCY SHUTDOWN EQUIPMENT (Continued)

For emergency equipment and shutdown descriptions within the existing Linam Ranch Plant refer to the separate contingency plan for the Linam Ranch Plant Site. There will be additional hydrogen sulfide detectors installed at the plant site around the new acid gas compressor and near the new ESD valves. There will be ESD valves installed between the amine system and AGI compressor, on the AGI pipeline leaving the plant, and on the acid gas pipeline north of the underground road crossing of U.S. Highway 62/180. The ESD valves will be shutdown at 50 ppm hydrogen sulfide concentration in the acid gas compressor or acid gas pipeline ESD valve areas.

In the event of an acid gas well-site shutdown and/or an acid gas booster compressor shutdown at the Linam Ranch Plant there are existing pressure controls to automatically divert the acid gas volume to the Linam Ranch Plant Acid Gas Flare. Depending on the incident the rest of the Linam Ranch Plant could continue to operate if appropriate.

Note that the Acid Gas Flare will flare large volumes at the Well-Site only under extreme emergencies in the event the compressor is over-pressured and a Process Safety Valve (PSV) relieves to the acid gas flare. During other shutdowns of the well-site compression or the injection well the acid gas will be flared at the Linam Ranch Plant.

Emergency Equipment on site at the Acid Gas Injection Facility:

Quantity	Description
9	Ansul 30# Fire Extinguishers
6	5# ABC Fire Extinguishers
5	Wind Socks
1	150# Fire Extinguisher – Wheeled Units
22	Fixed Ambient H_2S Monitors
10	SCBA – 30-Minute Breathing Air Packs
4	First Aid Kits
2	Fire Blankets (wool)
2	Eye Wash Stations
1	Emergency Showers
2	PPE Boxes

XVII. ATTACHMENTS, MAPS AND DRAWINGS

LISTING OF ATTACHMENTS, MAP AND DRAWINGS

1. Worst Case Scenario
2. Calculated Radius of Exposure (ROE)
3. Site Plot Plan
4. Maps – Calculated Radius of Exposure
5. Emergency Equipment Location Plan
6. Plant H2S Alarm System Location Plan
7. Electrical Classification Drawing
8. Hazardous Material Incident Notification Information Checklist
9. Contingency Plan Simplified Flowchart.

Attachment 1. - Worst Case Scenario for Acid Gas Injection at the Linam Ranch Gas Plant:

The basis for worst case calculations is 28% hydrogen sulfide in the acid gas from the Linam Ranch Gas Plant, which is at typical maximum concentration observed at the plant. The current permit limit for the Plant is 200 MMscfd as stated in section 3.f of the Air Quality Permit No. 436-M6, issued on June 7, 2002 by the State of New Mexico, Environment Department, Air Quality Bureau, which results in 4.6 MMscfd of Acid Gas containing 1.29 MMscfd of hydrogen sulfide.

Note that essentially all of the hydrogen sulfide in the plant feed gas is separated from the processed gas and becomes the acid gas stream. Therefore, the worst case calculated radius of exposure will be the same for the Acid Gas Injection Facility and for the Linam Ranch Gas Plant as a whole. Furthermore, the worst case scenario is being assumed in the standard calculations since it would be a rupture that results in release of all of the hydrogen sulfide from the acid gas. Calculations using the Pasquill-Gifford equations as described in OCD Rule 118 are presented on the following page.

DEFS also had a Quantitative Risk Analysis (QRA) study completed by an expert engineering contractor with experience, calculation methods, and computer programs for this type of analysis. The QRA considers the piping and equipment configuration, the actual gas volume based on operating conditions (pressure and temperature), and various release scenarios. Based on this information detailed calculations are completed to determine the hazard distances at 1% probability of fatality, which is approximately equal to the 100 ppm ROE and at 99% probability of fatality, which is approximately equal to the 500 ppm ROE. This study was completed at 5 MMscfd of acid gas with 25.2% hydrogen sulfide. This is a similar volume of hydrogen sulfide of 1.26 MMscfd compared to the standard calculations. Use of the QRA calculated ROE in place of the Pasquill-Gifford equations would require specific approval of the OCD. These QRA calculated numbers are also presented for information. They may provide some relative indication of the severity of various emergency situations.

Alternative Calculations of Radius of Exposure (ROE) – for consideration for approval by the division:

ACID GAS INJECTION FACILITY for LINAM RANCH GAS PROCESSING PLANT

QRA

HYDROGEN SULFIDE RADIUS OF EXPOSURE CALCULATIONS
(alternative distances from QRA)
March 2006

	H2S Concentration Mole %	Max Escape Rate MMSCFPD	Hazard Distance at 1% probability of fatality (equivalent to100 PPM ROE) (Ft)	Hazard Distance at 99% probability of fatality (equals 500 PPM ROE) (Ft)
Inlet Acid Gas Pipeline at Plant (8" underground line)	25.2	5.0	670	N/A
Well-Site				
Compressor Suction Line (8" above ground line)	25.2	5.0	1055	685
Compressor Unit & 3" line to well head	25.6	5.0	1400	920
Wellhead with SSSV failure	25.6	5.0	1815	1315
Wellhead with down hole check and SSV failure	25.6	5.0	4185	2595

Total hydrogen sulfide flow is 1.26 MMscfd

Standard Calculations of Radius of Exposure (ROE):

ACID GAS INJECTION FACILITY at LINAM RANCH GAS PROCESSING PLANT

HYDROGEN SULFIDE RADIUS OF EXPOSURE CALCULATIONS USING VOLUME AND H2S CONCENTRATION FROM EXISTING LINAM RANCH H2S CONTINGENCY PLAN

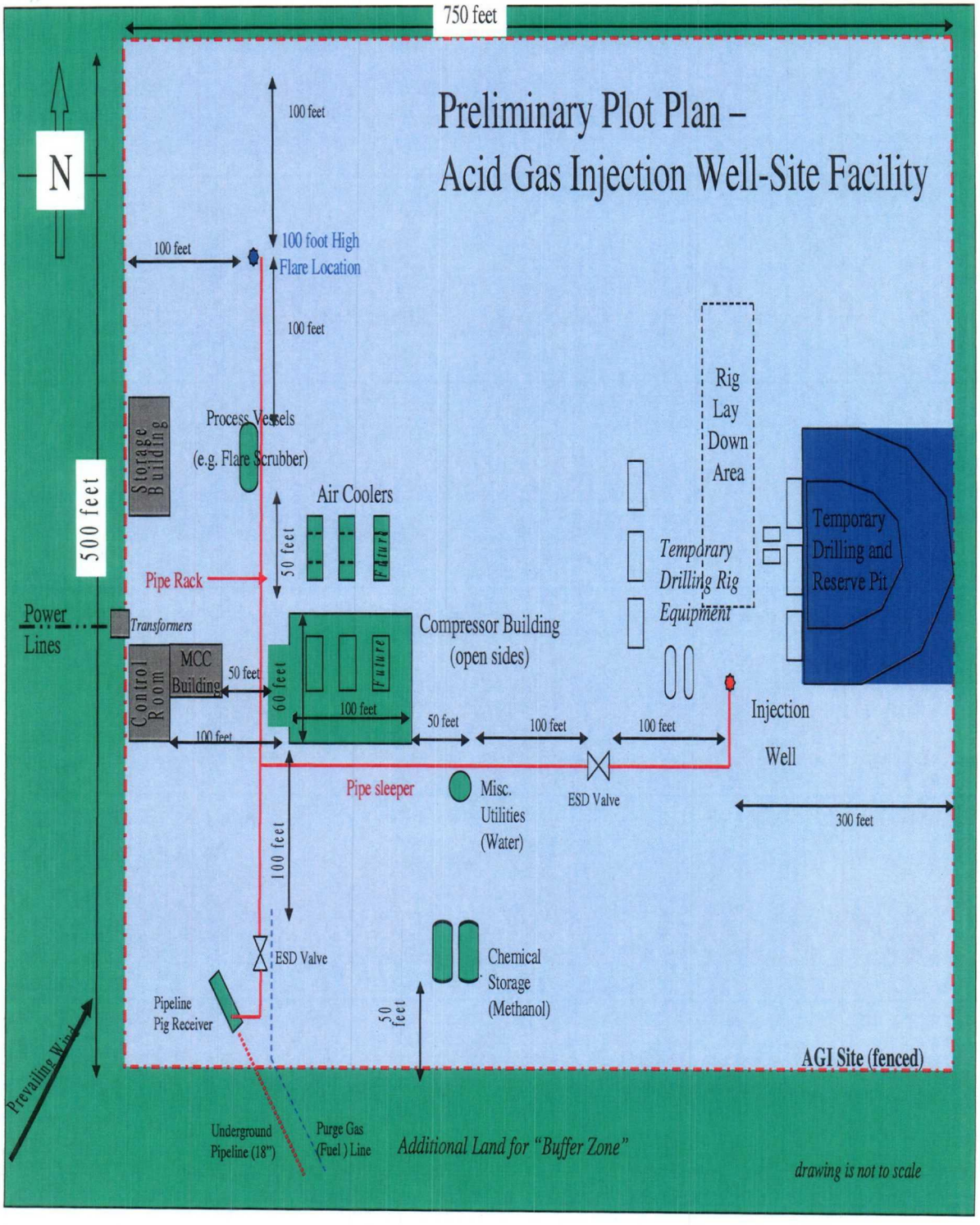
March 2006

	H2S Concentration Mole %	Max Escape Rate MMSCFPD	100 PPM ROE (Ft)	500 PPM ROE (Ft)
Acid Gas Pipeline or Compressor at Plant	28.0620	4.6	8914	4073
Acid Gas Pipeline	28.0620	4.6	8914	4073
Compressor Unit at Well-Site	28.0620	4.6	8914	4073
Wellhead	28.0620	4.6	8914	4073

Pasquill-Gifford Equations

100 PPM ROE = [(1.589)*(H2S Mole Fraction)*(Q)] ^ 0.6258
500 PPM ROE = [(0.4546)*(H2S Mole Fraction)*(Q)] ^ 0.6258
Where Q = scfpd
Note: Total hydrogen sulfide flow of 1.29 MMscfd

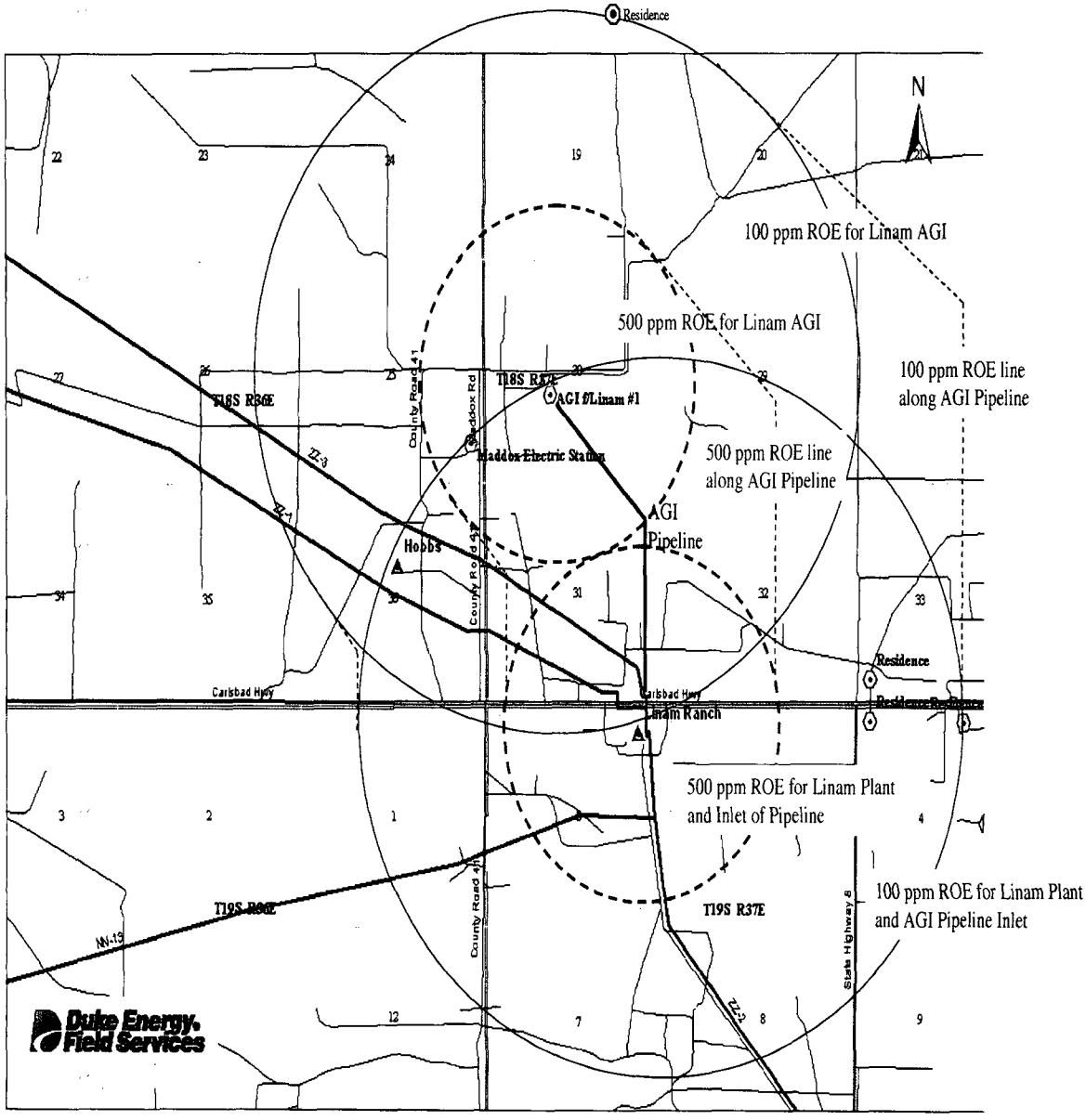
Facility Plot Plan



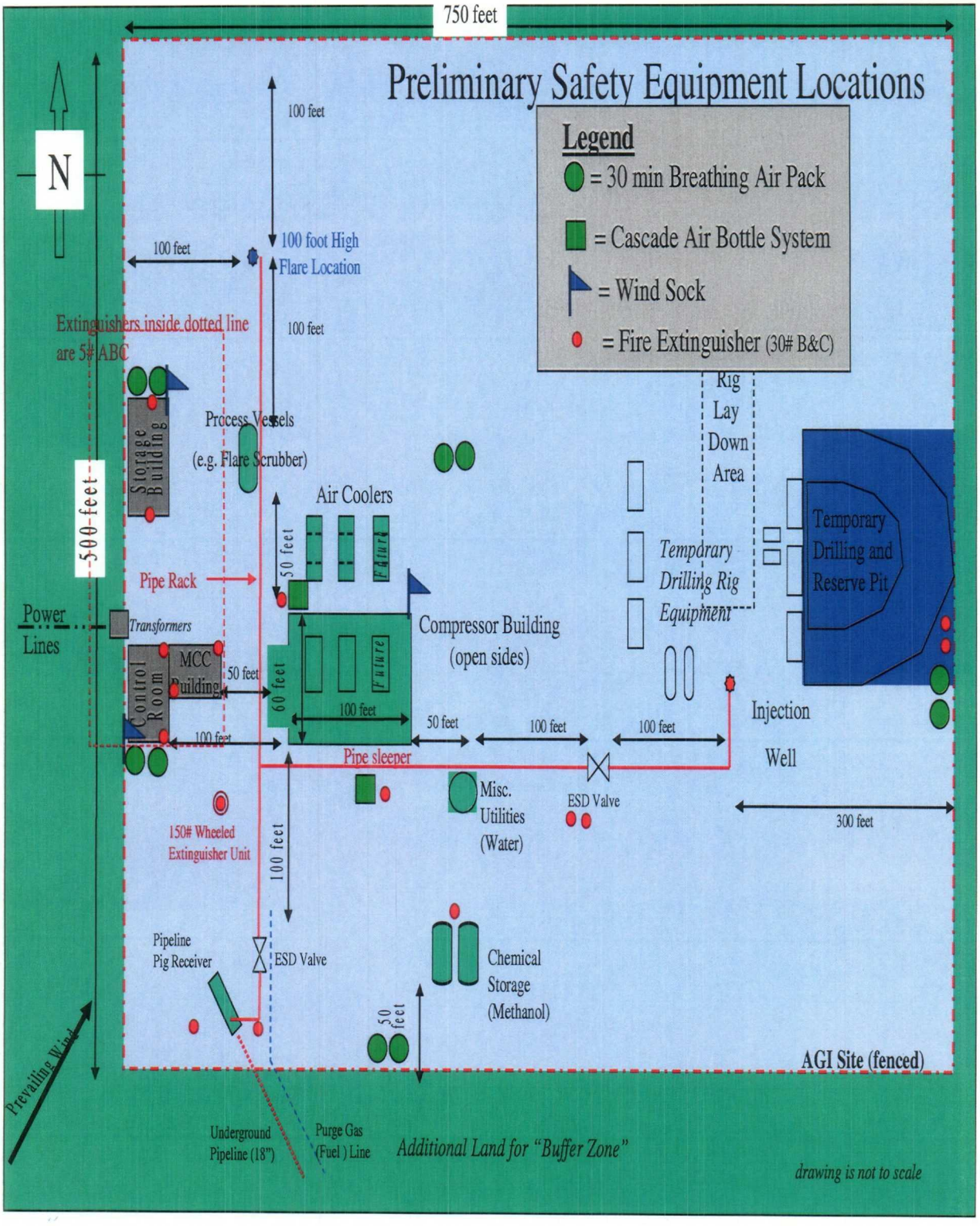
Calculated Radius of Exposure

(Drawing Prepared with calculated ROE from Pasquill-Gifford Equations as specified in OCD Rule 118. If an alternative calculation procedure is approved the drawing will be updated.)

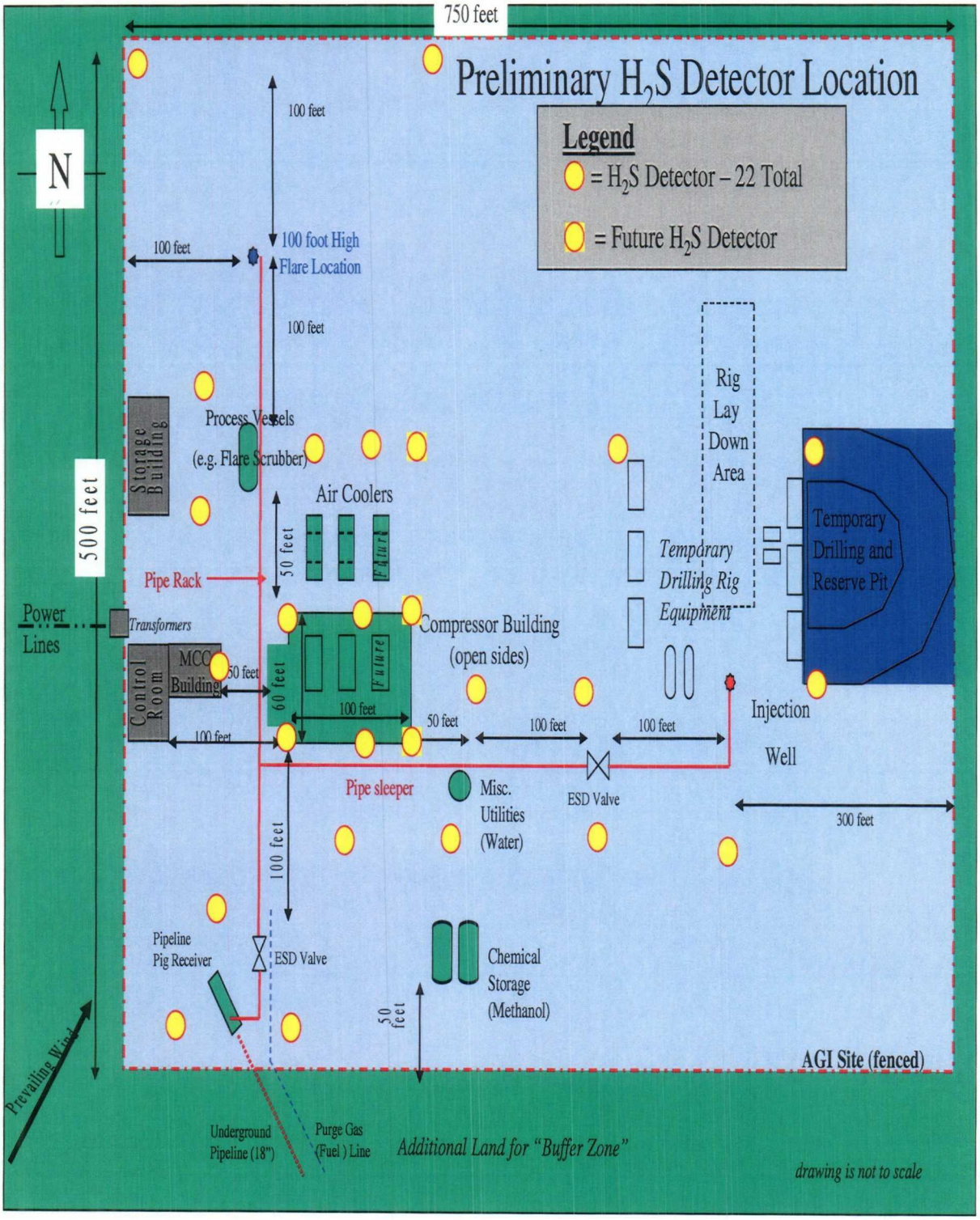
Radius of Exposure – Standard Calculations



Emergency Equipment Location Drawing



Plant H_2S Alarm System Location Plan Drawing



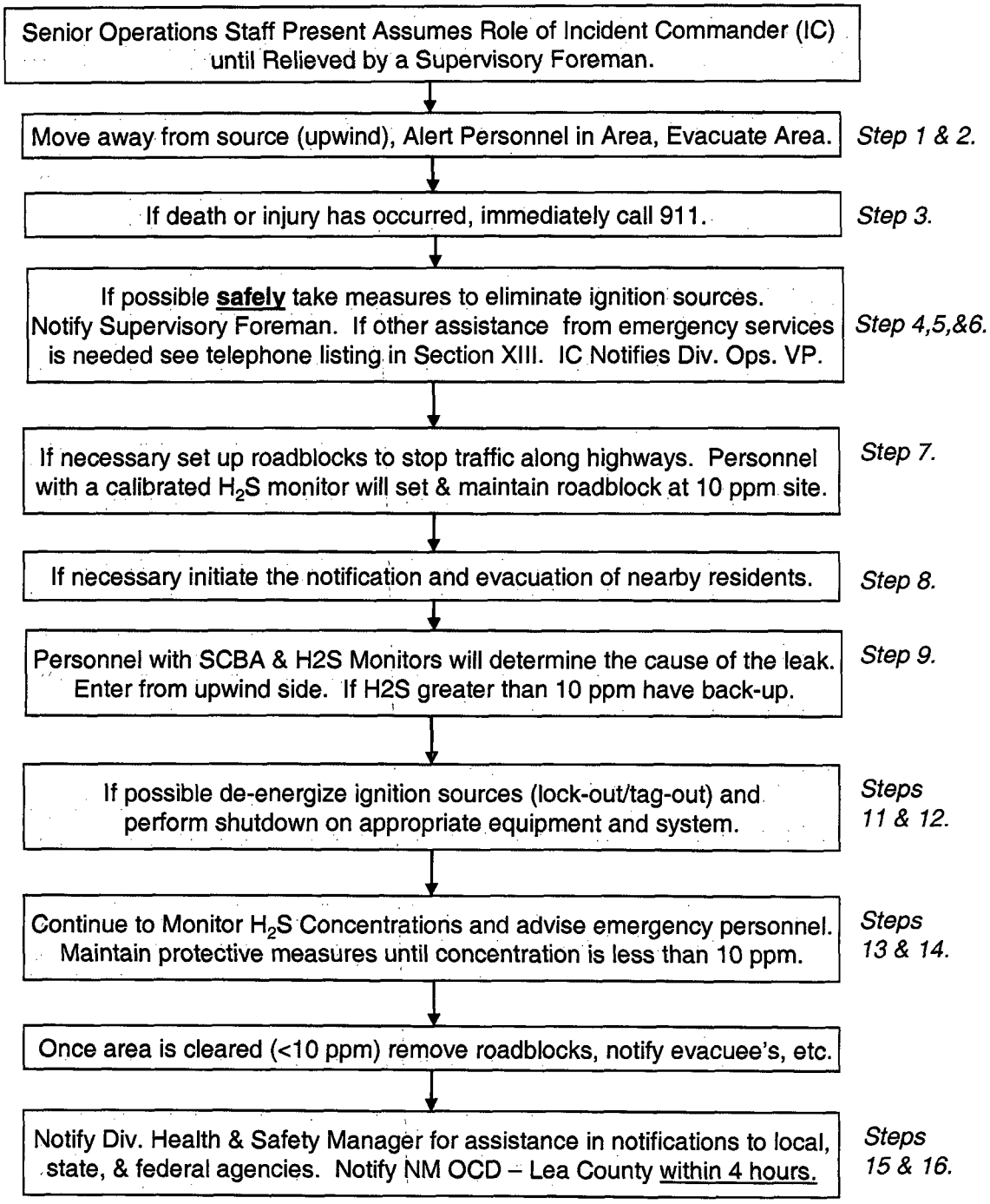
Electrical Classification Drawing (To be provided later)

Hazardous Materials Incident Notification Information Checklist

The following information should be given to dispatch. Dispatch should be instructed to give all information received to response agencies.

Notification	Time Dispatch Notified:
Caller	Caller Name: _____ Caller Location: _____ Caller Phone Number: _____
Hazardous Materials Information	Incident location _____ (Address or Nearest Milepost or Exit) Time Incident Occurred _____ Container Type _____ (Truck, train car, drum storage, Tank, pipeline, etc.) Substance _____ UN Identification Number _____ Other Identification _____ (Placards, shipping papers, etc.) Amount of material spilled/released _____ Current condition of material _____ (Flowing, on fire, vapors present, etc.)
Scene Description	Weather conditions _____ (i.e., sunny, overcast, wet, dry, etc.) Wind direction _____ Wind speed _____ Terrain _____ (i.e., valley, stream bed, depression, asphalt, etc.) Environmental Concerns _____ (Streams, sewers, etc.)
Affected Population	Number of people affected _____ Condition of people affected _____
Resources	Resources required _____ (EMS, HazMat Team, Fire Department, etc.)
Response	Response actions anticipated And/or in progress (i.e., rescue, fire suppression, containment, etc.)
Comments	_____ _____ _____ _____ _____

Hydrogen Sulfide Contingency Plan Flowchart (see plan pages 8 and 9)



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