

## QUALIFICATIONS

I received a doctorate in low-temperature physics from the University of Wisconsin in 1964. I was employed at the Los Alamos National Laboratory from 1968 until I elected early retirement in 1993. During my employment at the Laboratory, I worked in engineering physics on thermonuclear device design, solar buildings, and heat transfer. During my last three years at the Laboratory, I spent part of my time investigating a novel scheme for improving the vapor extraction of volatile contaminants, such as gasoline, from the ground. This led to my appointment as the project leader for the investigation of a large area containing buried chemical wastes, plumes of solvent vapors, and radioactive wastes. That ongoing investigation is directed to finding the nature and extent of contamination, and to obtaining data for evaluating the various remediation methods. Although on a much larger scale, that effort is analogous to the activities that might be conducted at a petroleum spill under a Stage 1 abatement plan of the proposed Rule 19.

Since retirement, I have worked for a private contractor in continuing the investigation of subsurface air motion and its relationship to the remediation of contaminated soils.

I represent a view separate from that of the Committee, or any person on the Committee. I have experience both as the agent of a responsible person, burdened with regulation. I have experience as a citizen seeking better protection of the environment. And I have experience as a scientist researching better, cheaper ways to remedy contaminants in the vadose zone. I have watched some of the Committee's proceedings; I attended one meeting and field trip as an observer. I feel I understand the difficulties and compromises with which the committee members worked.

## NMCCA&W

I appear here as a member and as the representative of the New Mexico Citizens for Clean Air and Water (NMCCA&W), a statewide organization of citizens who advocate environmental protection and improvement. NMCCA&W was founded in 1969, primarily in response to stack emissions from large coal-burning power plants. We lobbied for the legislation that established the Environmental Improvement Division, which became the Environment Department. We worked through the regulatory hearings of the 1970's that brought modern environmental protection to New Mexico. Since then, our work has continued through many issues including air emissions, water pollution, mine reclamation, and enforcement. We are as proud of our record of fairness to industry's concerns as we are of our contributions to environmental progress.

Now that the basic rules and public understanding of environmental protection have been established, our group is turning increasing efforts to establishing a climate in which industry, government, and the citizens cooperate in a spirit of trust. Our motive is not mere idealism. The lack of trust causes rigid rules, unproductive paperwork, and bureaucratic formalism that often

impedes environmental progress. Trust does not mean that all parties will have the same objective, but it does mean that all parties will openly share all relevant information. The work of the Rule 116 committee was based on an assumption that the participants would share, rather than hide, information. Our group is participating in discussions with the Groundwater Bureau, the New Mexico Oil and Gas Association, and a petroleum retailer to establish an agreement in which enforced abatement of iron and manganese is postponed while the State conducts monitoring with industry support, learning whether these contaminants can be abated by the natural return of oxygen to the aquifer. Two members of NMCCA&W, state chairman Dr. John Bartlit and co-founder Dr. Mike Williams, are participants in NMED's initiative with industry to streamline air permitting procedures. Dr. Bartlit is a member of the Action Team working on streamlining through "Trust and Partnering." I describe this effort toward trust because later in my testimony I will argue both for increased opportunity for public participation in abatement plans, and for relaxing the paperwork requirements for industry. I look forward to a time when open voluntary disclosure of information, made accessible by electronic publication, will eliminate the need for paperwork, either as a mechanism of control or a legal defense.

#### NEED FOR REGULATIONS

As seen by the citizens, environmental restoration under the OCD has, in the past, been largely governed by informal guidelines. Although the guidelines established some degree of trust between the industry and the regulators, the process has lacked uniformity and left the public out of the process. Decisions have not always been based upon the environmental impact. Through the adoption of these regulations, we hope some uniformity can be brought to the regulatory process, so that industry does not have a moving target, so that responsible companies are not unfairly penalized because they do clean up spills while less responsible companies are indirectly rewarded by escaping cleanup.

#### THE VADOSE ZONE

We understand that the Commission must base its action on evidence presented in this hearing. It is probable that the commission members know more about the vadose zone than I. In this testimony, I do not wish to appear to lecture the Commission in topics contained in schoolbooks. However, the New Mexico law relevant to this hearing is largely water law, while many releases occur to the vadose zone, which appears to be dry. Therefore it is necessary to establish in the record the relationship of water to the vadose zone.

The term "vadose zone" refers to all of the ground between the surface and the top of the water table. The vadose zone is not completely dry. The ground--composed of various fractions of granular soil, organic matter, and rock--is porous to varying degrees. Pore space typically occupies 25% to 50% of the volume of ordinary soil that is dug with a shovel. Dense rock may have little pore space, but the volcanic tuff beneath Los Alamos--which

appears to be solid rock--has about 50% pore space. When the pore space is filled with water--as occurs beneath the water table--the soil is referred to as "saturated." Above the water table, the water is pulled upward into the pore space by capillary action, much as a towel will wick water upward when dipped into a bucket of water. When rain temporarily forms a puddle on ground surface, that water will initially trickle downward through the pores in a saturated flow, carrying available contaminants with it. As the flow progresses downward, the contaminants will often become bound to the particles of soil. The soil thereby purifies the moving water before it reaches the water table. That's why well water and spring water have historically been regarded as clean.

The ground is not saturated in the vadose zone, but water is still present as a thin film held between soil particles by capillary action. Even a very dry soil might have 5% of its total volume occupied by water. In that unsaturated condition, the water will still flow, but very slowly. The capillary action can move water upward, against gravity. In general, water in the vadose zone will move up, down, or horizontally, decreasing or increasing the amount of liquid between particles, until the capillary forces are just balanced by gravity. In addition to gravity and capillary forces, chemical forces can cause water to move. Water can also move in the form of vapor. Just as the air in a closed jar half-filled with water is at 100% humidity, the air in the pore spaces of the ground is at nearly 100% humidity--even in very dry soils. That's why the bottom of a steel barrel rusts when it is left standing on apparently dry ground.

Petroleum contaminants move in the vadose zone in a fashion similar to water. Some of the contaminants dissolve in water, and move with the liquid. Liquid contaminants, called non-aqueous petroleum liquid (NAPL) move by gravity and capillary action. Volatile contaminants can also move in the vapor phase--often moving far beyond the liquid NAPL to contaminate in pore water far from the obvious petroleum liquid. Thus, a contaminated vadose zone can act as an enduring source of contamination for ground water. However, it also can act as an enduring source of contamination for the pore water, which may move to ground water, to surface water, or to the roots of plants. For this reason, it is usually important to remedy releases in the vadose zone, whether or not surface water or ground water is immediately contaminated. Regulation should encourage immediate cleanup of the vadose zone, rather than waiting for useful water to become contaminated because, after contamination has spread to ground water or surface water, cleanup is usually much more difficult and more expensive.

#### EIGHT QUARTERS OF SAMPLING

Some persons may argue that successful abatement can be proved with one or two quarterly samples. In some cases, that may be true. The regulations specify that standards must be met for eight quarters. This is because pore gas, surface water, or ground water may appear to be clean while contaminants remain in

globules of NAPL or sorbed on the soil. After some time, the contaminants may diffuse from the residual sources into the water or pore gas. The migration of contaminants may be irregular and slow, and the sampling itself is subject to uncertainty. Therefore, sampling must usually be repeated over an extended time to confirm true cleanup.

CHANGES IN RULE 116

The New Mexico Citizens for Clean Air and Water (NMCCA&W) support the adoption of the draft OCD proposed replacement Rule 116 dated November 6, 1996, with the changes suggested below. Our suggested changes are intended to combine and simplify the proposed Rule 116 and Rule 19.N. We do not intend to alter the meaning of the proposed language, other than in 116.B where we suggest use of the term "facility" in place of "location". For clarity, we repeat wording of the November 6 draft Rule 116 where it is retained. Replacement wording is in **bold text**. Comments are in *[italics]*.

116.A. *[no change]*

116.B REPORTING REQUIREMENTS: Notification of an unauthorized release shall be made by the person operating or controlling either the release or the **facility** of the release in accordance with the following requirements:

- (1) A Major Release is either
  - (a) a release of a volume, excluding natural gases, in excess of 25 barrels; or
  - (b) a release of any volume which:
    - (i) results in a fire;
    - (ii) will reach **ground water, surface water, or a water course**;
    - (iii) may with reasonable probability endanger public health, **be detrimental to water, or cause an exceedance of the standards in 19 NMAC 15.A.19.B(1), B(2), or B(3)**; or
    - (iv) results in substantial damage to property or the environment; or
  - (c) a release of natural gases in excess of 500 mcf.
- (2) A Major Release shall be reported by verbal notification within twenty-four (24) hours of discovery, and by written notification on Division Form C-141 within fifteen (15) days of discovery. The verbal notification shall contain the information to be presented on Form C-141, to the best of the reporting person's knowledge. The verbal and written notifications shall be made to:
  - (a) the District Office of the Division for the area within which the release takes place; and
  - (b) the Environmental Bureau Chief of the Division.
- (3) A Minor Release is either
  - (a) a release of a volume greater than 5 barrels but not more than 25 barrels; or
  - (b) a volume that is more than twenty-five (25) barrels of unreported cumulative releases occurring within a common area of one acre; or
  - (c) a release of a volume greater than 50 mcf but less than 500 mcf of natural gases.

- (4) A Minor Release shall be reported by verbal notification within twenty-four (24) hours of discovery, and by written notification on the Division Form C-141 within fifteen (15) days of discovery. The verbal notification shall contain the information to be presented on Form C-141, to the best of the reporting person's knowledge. The verbal and written notifications shall be made to the District Office of the Division for the area within which the release takes place.

116.C. and 116.D. [*delete the contents of draft 116.C and renumber 116.D to 116.C*]

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CHANGES IN RULE 15.A.7

The New Mexico Citizens for Clean Air and Water support the adoption of the committee draft additions to Rule 15.A.7 with a slightly different definition of remediation plan as suggested below. Revised wording is in **bold text**.

**REMEDIATION PLAN** shall mean a written document to address unauthorized releases that will be remedied within one (1) year after notice is required to be given pursuant to **RULE 116.B (19 NMAC 15.C.116.B.)** The plan may include description of the nature and extent of contamination; description of investigations and corrective actions to be taken; and description of monitoring that may be required for compliance with **19 NMAC 15.A.19.B.4.**

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CHANGES IN RULE 19

NMCCA&W supports the adoption of the committee draft Rule 19 with the changes suggested below. For clarity, we repeat retained wording. Added, inserted, or altered wording is in **bold text**. Comments are in *italics*. We present the complete, suggested wording of each subparagraph as a combination of ordinary and bold text to indicate the intent of our suggested changes.

19.D (1)

- (g) on an emergency basis, or while abatement plan approval is pending, or in a manner that will result in compliance with the standards and requirements set forth in Paragraph B **except subparagraph B.4** within one year after notice is required to be given pursuant to 19 NMAC 15.C.116.B, provided that the Division does not object to the abatement action.

19.G.2

**For purposes of this paragraph, an administratively complete Stage 1 abatement plan is a document that satisfies the requirements of 19.E.(3), and an administratively complete Stage 2 abatement plan is a document that satisfies the requirements of 19.E.(4)(b). Within fifteen (15) days after the Division determines that a Stage 1 abatement plan or a Stage 2 abatement plan is administratively complete, the responsible person will issue a public notice in a form approved by the Division in a newspaper of general circulation in the county in which the release occurred, and in a newspaper of general circulation in the State. The public notice shall include, as approved in advance by the Director:**

**(c) brief description of the source, extent, and estimated volume of release, whether the release occurred into the vadose zone, ground water or surface water; and a description of the proposed Stage 1 or Stage 2 abatement plan;**

*[Delete subparagraph (e) because it is redundant with subparagraph (g). Renumber (f) to (e). The replacement subparagraph (e) follows.]*

**(e) statement that a copy of the abatement plan can be viewed by the public at the Division's main office and at the Division's District office for the area in which the release occurred, and a statement describing how the abatement plan can be accessed by the public electronically from a Division-maintained site if such access is available.**

*[Renumber (g) to (f). The replacement (f) follows.]*

**(f) statement that the following comments and requests will be accepted for consideration if received by the Director within thirty (30) days after the date of publication of public notice:**

- (i) written comments on the abatement plan; and**
- (ii) for a Stage 2 abatement plan, written requests for a public hearing that include reasons why a hearing should be held.**

19.G.3

Any person seeking to comment on a **Stage 1 abatement plan**, or to comment or request a public hearing on a **Stage 2 abatement plan**, must file written comments or hearing requests with the Division within thirty (30) days of the date of public notice, or within thirty (30) days of receipt by the Director of a proposed significant modification of a **Stage 2 abatement plan**. Requests for a public hearing must set forth the reasons why a hearing should be held. A public hearing shall be held if the Director determines that there is significant public interest or that the request has technical merit.

19.L.

*[Typographical error: replace 116.E with 116.D.]*

19.N.

*[Delete all of 19.N. It is redundant and in potential conflict with the revised Rule 116, if 116.B. is changed we suggest.]*

19.H.

(1) The Director shall, within sixty (60) days of receiving an **administratively complete Stage 1 abatement plan**, a site investigation report, a technical infeasibility demonstration, or an abatement completion report, approve the document, or notify the responsible person of the document's deficiency, based upon the information available.



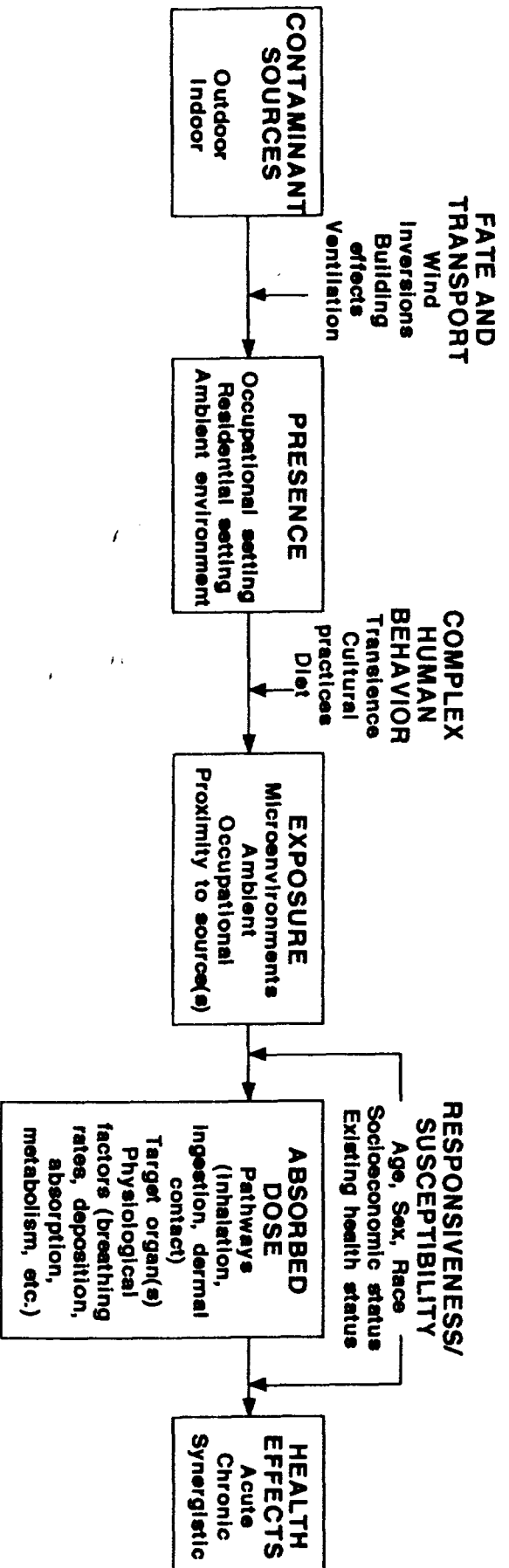
**Table 1 — Hazardous Constituents, Hydrocarbons and Other Pollutants  
in Oil and Natural Gas Production Wastes  
based on EPA Data and Experience and Studies in New Mexico**

Hazardous constituent	found by EPA* in wastes	found by API	found by N.M.** in wastes	Listed in 40 CFR 261 App. VIII	Exceeded N.M. Ground Water Standard***
anthracenes	?	?	yes	no	?
antimony	yes	?	?	yes	?
arsenic-dws	yes	?	yes	yes	yes
barium-dws	yes	?	yes	yes	?
benzene-dws	yes	?	yes	yes	yes
biphenyls	?	?	yes	no	?
boron	yes	?	yes	no	?
C4 alkylated benzenes	?	?	yes	no	present
C5-C7 hydrocarbons	?	?	yes	no	?
C6-C8 hydrocarbons	?	?	yes	no	?
C10-C20 hydrocarbons	?	?	yes	no	yes
cadmium-dws	yes	?	yes	yes	?
chromium (VI)-dws	yes	?	yes	yes	?
decanes	?	?	yes	no	present
ethylbenzene-dws	?	?	yes	no	yes
fluorenes	?	?	yes	no	?
fluoride-dws	yes	?	yes	no	?
heptanes	?	?	yes	no	present
hexanes	?	?	yes	no	present
lead-dws	yes	?	yes	yes	yes
manganese	?	?	yes	no	?
naphthalenes	?	?	yes	yes	?
nonanes	?	?	yes	no	present
octanes	?	?	yes	no	present
phenanthrene	yes	?	?	no	N/A
phenols	?	?	yes	yes	yes
pyrenes	?	?	yes	no	?
selenium-dws	?	?	yes	yes	yes
strontium	?	?	yes	no	?
toluene-dws	?	?	yes	yes	yes
xylene (total)	?	?	yes	no	yes
zinc-dws	?	?	yes	yes	?

dws — constituent also assigned federal drinking water standard

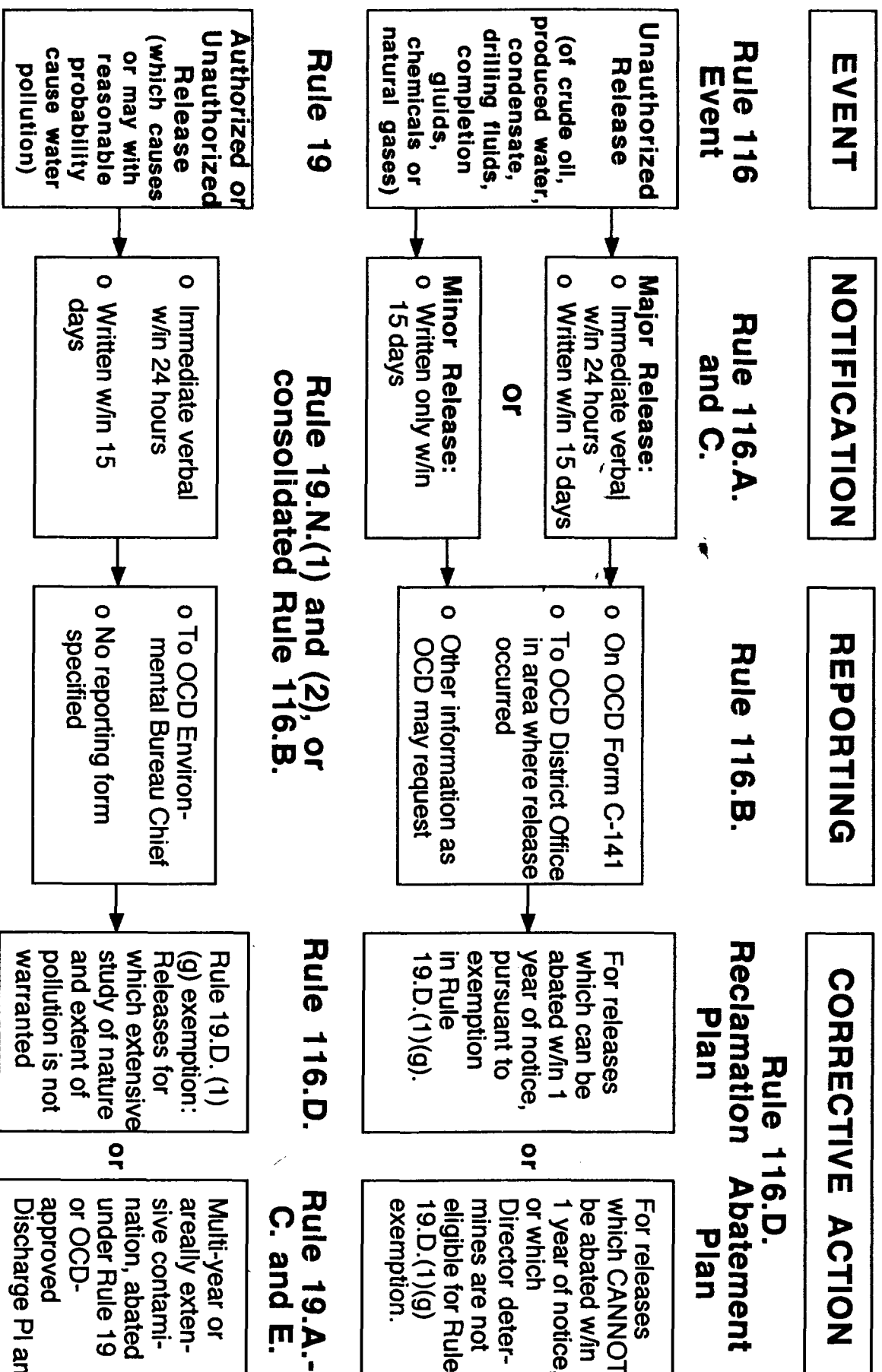
N/A — not applicable (no standard for the given constituent)

# **Biological Impact Pathway Model (Ryan and Lambert, 1991), Modified for Consideration of Cultural, Social and Economic Factors**



# OCD RELEASE NOTIFICATION AND CORRECTIVE ACTION

(proposed Rules 116 and 19)



# **FAX FROM SRIC**

**Southwest Research and Information Center  
P.O. Box 4524 (105 Stanford SE)  
Albuquerque, NM 87106  
ph. 505-262-1862; fax 505-262-1864**

**Date:** October 28, 1996

**To:** William J. LeMay, Chairman  
Oil Conservation Commission  
phone: 505-827-7132; fax: 505-827-8177

**From:** Chris Shuey, SRIC

**# Pages:** 3

**Message:** Please find attached a Notice of Intent to Testify on November 14, 1996,  
in Case Nos. 11352 and 11635.