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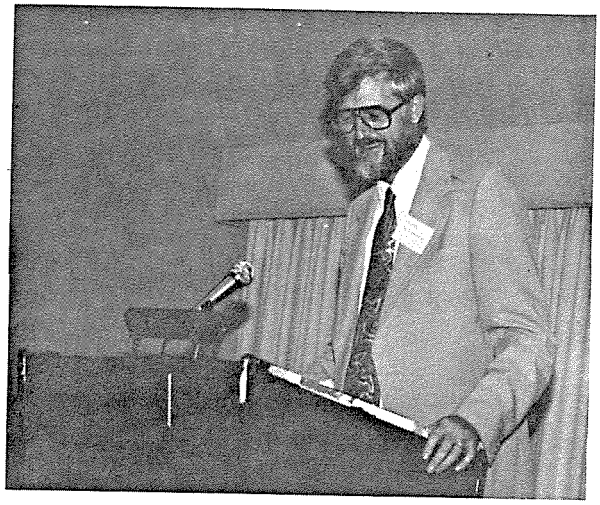

INTRODUCTION TO SURFACE WATER ISSUES AND CONFLICTS

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This paper sets forth my views on problems existing in the environmental regulatory milieu as they apply to New Mexico's surface water. The focus of this discussion will be surface water quality issues that are conflicts with common sense and rational decision making to an extent that the real issues are masked. Surface water issues addressed concern:

- application of water quality standards to highly regulated streams that can have no to very low flow and dry arroyos;
- water quality standards themselves with ammonia as an example;
- conflicts between water quality standards and irrigation use of surface water; and
- water quality standards and water rights.

Among environmental regulators and enforcers, a **tight bomb pattern syndrome** prevails. The term "tight bomb pattern" comes from a popular book of my college generation called *Catch 22* by Joseph Heller. Let us consider some snippets from this book that give its flavor and illustrate the tight bomb pattern syndrome concept.

The first obscure reference is on page 193:

> The chaplain hesitated, feeling himself on unfamiliar ground again. "Yes, sir," he replied finally. "I think it's conceivable that such an action could interfere with your chances of having the prayers for a tighter bomb pattern answered."
> "I wasn't even thinking about that!" cried the colonel, with his eyes blinking and splashing like puddles. "You mean that

> God might even decide to punish me by giving us a looser bomb pattern?"

An aside on parades (page 317) before it's explained:

> General Peckem began to wonder with genuine concern just what sort of (expletive deleted, English version of his German name) the Pentagon had foisted on him. "What do you know about?" he asked acidly.
> "Parades," answered Colonel Scheisskopf eagerly. "Will I be able to send out memos about parades?"
> "As long as you don't schedule any." General Peckem returned to his chair still wearing a frown.
> "Can I schedule parades and then call them off?"
> General Peckem brightened instantly. "Why, that's a wonderful idea! But just send out weekly announcements postponing the parades. Don't even bother to schedule them."

Then to page 318:

> "Don't let it worry you, Scheisskopf," said General Peckem, congratulating himself on how adeptly he had fit Colonel Scheisskopf into his standard method of operation. Already his two colonels were barely on speaking terms. "Colonel Cargill envies you because of the splendid job you're doing on parades. He's afraid I'm going to put you in charge of bomb patterns."
> Colonel Scheisskopf was all ears. "What are bomb patterns?"
> "Bomb patterns?" General Peckem repeated, twinkling with self-satisfied good humor. "A bomb pattern is a term I dreamed up just several weeks ago. It means nothing, but you'd be surprised at how rapidly it's caught on. Why, I've got all sorts of people convinced I think it's important for the bombs to explode close together and make a neat aerial photograph. There's one colonel in Pianosa who's hardly concerned any more with whether he hits the target or not."

And more on page 321:

> Colonel Korn gave Major Danby's shoulder a friendly squeeze without changing his unfriendly expression. "Carry on with the briefing, Danby. And make sure they understand the importance of a tight bomb pattern."
> "Oh, no Colonel," Major Danby blurted out, blinking upward. "Not for this target. . . ."
> . . . "We don't care about the roadblock," Colonel Korn informed him. "Colonel Cathcart wants to come out of this mission with a good clean aerial photograph he won't be ashamed to send through channels. Don't forget that General Peckem will be here for the full briefing, and you know how he feels about bomb patterns."

Page 323:

> "Go on out there and bomb—for me, for your country, for God, and for that great American, General P.P. Peckem. And let's see you put all those bombs on a dime!"

The book's hero on page 324:

> Yossarian no longer gave a damn where his bombs fell . . .

Too many of our environmental solutions are tight bomb patterns. Somewhere in the process we have lost sight of the target in the substantive sense. Let's give a damn where our environmental bombs fall.

I don't view the syndrome as applied to environmental solutions with the malicious glee that pervades *Catch 22* but rather as a descriptive term of an inevitable phase in the environmental movement which needs to mature into a new era, an era of harder targets and fewer bombs.

Let me characterize some antidotes to the tight bomb pattern syndrome as I've found them expressed in the September 1990 Environmental

Protection Agency (EPA) report entitled, *Reducing Risk: Setting Priorities and Strategies for Environmental Protection*. Key words and phrases from this report are:

- Reasoned use of discretion
- Prioritization
- Public perception vs. scientific understanding
- Bias against new approaches
- Temporal/Spatial extent of risk from pollution

Discretion - The overriding disturbing element of environmental law to me is the limits on discretion it imposes in successive layers as it trickles down from Congress. It's as if only the big guys upstream can be trusted to set the rules. Yet, discretion does and should exist, and **must** be used by those who have it in a way they think it makes sense. New Mexico should not lockstep with General EPA Dallas to put its nitrification/denitrification bombs on Albuquerque's Wastewater Plant unless it makes sense. If not, let's find another target.

The EPA-commissioned report expressed it this way:

> "EPA should reflect risk-based priorities in its budget process. Although EPA's budget priorities are determined to a large extent by the different environmental laws that the Agency implements, **it should use whatever discretion it has to focus budget resources at those environmental problems that pose the most serious risks.**" (page 6)

So should the Environmental Improvement Division (EID). And to the extent EID or the Water Quality Control Commission can focus (by regulation or persuasion) others' budgets toward "environmental problems that pose the most serious risks," they should do so.

Prioritization - This is the report's overriding theme and an essential element in the rational use of discretion. The report states:

> "Seen in its historical context, the ad hoc development of U.S. national environmental policy is understandable. Yet 20 years of experience in developing and implementing environmental policy has demonstrated that not all environmental problems are equally serious and not all remediation efforts are equally urgent. The nation cannot do everything at once. In national efforts to protect the environment, the most obvious steps have been taken to reduce the most obvious risks. Now environmental priorities must be set." (page 6)
>
> "These priorities should be based on an explicit comparison of the relative risk posed by different environmental problems, and, more specifically, on the opportunities for cost-effective risk reduction." (Appendix C, page 4)

The state should heed this advice.

Public Perception vs. Scientific Understanding -

> "Public opinion polls taken over the past several years confirm that people are more worried about environmental problems now than they were 20 years ago when the first wave of environmental concern led to major changes in national policy. But the remaining and emerging environmental risks considered most serious by the general public today are different from those considered most serious by the technical professionals charged with reducing environmental risk." (page 12)

And:

> "EPA's budgetary and programmatic priorities are established largely by Congress, which in turn responds to the interests expressed by the electorate. The public's attitude about an environmental problem is often heavily influenced by qualitative aspects of the risks it presents—whether the risks are voluntary or involuntary; whether there is an identifiable 'villain' responsible for the problem; whether the risks are familiar and predictable or unusual and dreaded. By contrast, scientists and other technical experts are trained to judge the serious-

> ness of an environmental problem in much more quantitative terms, asking, for example, about the number and severity of adverse effects likely to be caused by the problem. As a result, the environmental problems that they consider most important often do not match the priorities set by Congress." (Appendix C., pages 13, 14)

For environmental decision makers to rely solely on public perceptions—to the exclusion of their own views of reality—is poor policy and an injustice to the public served.

Bias Against New Approaches -

> "EPA needs to overcome its bias against new approaches. Today, when new approaches are examined, they tend to be held to a higher level of performance than existing approaches. There are long lists of known implementation problems with existing approaches but the status quo continues partly because thorough evaluations of the effectiveness and cost of existing programs are not routinely performed. EPA needs to allocate resources to non-conventional approaches and to give these types of measures serious consideration in agency decision making." (Appendix C, page 5)

One can substitute EID and the state for EPA.

Temporal/Spatial Extent and Intensity of Exposure from Pollution -

> "... Other aspects of potential environmental problems (i.e., their temporal and spatial dimensions) also must be given considerable weight in any analysis of relative environmental risk. Consideration of time and space can help guide judgments about relative risks in the absence of complete data."
> "The time and space dimensions of environmental problems should weigh heavily in any comparison of relative environmental risks. For example, if long-lived pollutants like DDT and PCBs can become concentrated in the food chain and pose a threat to future as well as present human and ecological health, those future risks should be taken into account when relative risks are compared. Similarly, if global climate change or stratospheric ozone depletion has the potential to affect the health and/or economic well-being of virtually everyone on earth, now and in the future, the extent and duration of the risk should suggest a relatively high-risk ranking." (page 10)

The report set out the following considerations for ranking environmental concerns:

- the spatial extent of the area subjected to the stress;
- the importance of the ecosystem that is actually affected within the stressed area;
- the potential for the problem to cause ecological effects and the ecological response;
- the intensity of exposure; and
- the temporal dimension of both effects and the potential ecological recovery. (Appendix A, page 12)

Let's not lump toxics together without distinction. DDT accumulates as it goes up the food chain. Ammonia dissipates as it goes down the river.

To sum up, the tight bomb pattern syndrome can be avoided by "elbows-out," reasoned use of discretion to seek environmental goals consistent with the New Mexico water environment and priorities with due regard to New Mexico water environmental problems. Legislation and regulations should provide for administratively and judicially reviewable discretion to fit environmental goals to site-specific realities. Bureaucrats need to think.

All should agree that costs and benefits are essential ingredients of environmental prioritization. Money spent for environmental reasons with no or minimal benefit is not available for other things including environmental programs of real, substantial and comparatively greater benefit. Environmental progress should relate to dollars spent but can't be measured by dollars spent. On a related point, perceptions should not blur differences that might warrant differentiation nor, on the other hand, make distinctions of emotional or

semantic import but that shouldn't make a difference. All of these are alive and well in the water quality regulatory business.

New Mexico Water Quality Standards

A brief summary discussion of the New Mexico Surface Water Quality Standards regulations provides a backdrop to the water quality issues that will be discussed.

In concept, the standards protect, maintain, and in some cases improve water quality in New Mexico's surface waters, for the protection, maintenance and attainment of desirable uses of the surface waters. As set out in the standards:

> "The purpose of these standards is to designate the uses for which the surface waters of the State of New Mexico shall be protected and to prescribe the water quality standards necessary to sustain the designated uses."

Within the standards, uses are variously labelled as "designated," "attainable" and "existing." Stream reaches, ponds and lakes are assigned designated uses that are either "existing" or "attainable." "Existing" uses are presumably those that in fact exist in a given surface water, whereas "attainable" uses are those that a given surface water could achieve with implementation of the standards for that water.

Surface water uses include:

- Five subcategories of fishery: high quality cold water, cold water, marginal cold water, warm water, and limited warm water;
- Primary (swimming) or secondary (boating, bank fishing) contact recreation;
- Domestic water supply;
- Livestock and wildlife watering and
- Irrigation.

Protection standards are either numerical or narrative, and relate to water chemistry (dissolved oxygen, heavy metals, ammonia, chlorine, pesticides, organics, etc.), turbidity and temperature. Water quality parameters, to which no standards currently attach but nevertheless affect attainable or existing uses, are such things as stream flow or water body level variability, water depths, and stream or water body bottom constituency.

The standards apply to discharges into waters by placing waste-load limits to the pollutant concentration in the discharge to prevent the standards from being exceeded in the receiving waters beyond a mixing zone. The standards also contain purely regulatory elements such as determination of flow levels to which they apply for setting waste--load limits and defining their applicability to certain activities such as irrigation and flood operations.

Proposed changes to the standards for which a public hearing was held in June 1990 are pending. Proposed changes include amendments to text, definitions, changes to and additional numerical standards, etc. The proposed amendments have been initiated by the state EID for adoption by the New Mexico Water Quality Control Commission (WQCC).

Under the Water Quality Act, the WQCC "shall adopt water quality standards as a guide to water pollution control" (Section 74-6-4C, NMSA) and "shall adopt .... regulation to prevent or abate water pollution ...." (Section 74-6-4D). "Under the Act, 'water pollution' means introducing or permitting the introduction into water, either directly or indirectly, of one or more water contaminants in **such quantity and of such duration** as may with reasonable probability injure human health, animal or plant life or property, or to unreasonably interfere with the public welfare or the use of property." Section 74-6-2, NMSA. (Emphasis added). Accordingly, introduction of a contaminant into water is not water pollution unless it hurts someone or something.

The Water Quality Standards for Interstate and Intrastate Streams in New Mexico are clearly both the "guide" of subparagraph C. and the "regulations" of subparagraph D., despite informal statements by EID personnel that the standards are not regulations. This construction is important, because as regulations their promulgation requires the WQCC to "give weight it deems appropriate to all facts and circumstances, including but not limited to:

- character and degree of injury to or interference with health, welfare and property;

- the public interest, including social and economic value of the sources of water contaminants;
- technical practicability and economic reasonableness of reducing or eliminating water contaminants from the sources involved and previous experience with equipment and methods available to control the water contaminants involved;
- successive uses, including but not limited to, domestic, commercial, industrial, pastoral, agricultural, wildlife and recreational uses;
- feasibility of a user or a subsequent user treating the water before a subsequent use; and
- property rights and accustomed uses."

(Section 74-6-4-D)

Standards-Making Process

The standards-making process has two significant shortcomings. First, the process does not allow consideration of site-specific factors that often affect the validity and value of a particular standard as applied to a particular situation. In fact, the trend in the proposed changes is for the standards to be more and more generally applied across different designated uses and to all waters. Opportunity for site-specific analysis should allow the possibility of a specifically tailored standard or, more likely, allow conditions for meeting a standard that are less stringent.

On the other hand, to the extent that a site-specific analysis supports the standard and its routine application to a given location, credibility and support for the standards and the discharge permits they drive would be enhanced. Allowing site-specific determinations within otherwise generally applied numerical standards should protect designated uses. It would have the added benefit of creating and expanding New Mexico-specific technical knowledge applicable toward standards-setting and create and quantify true benefits gained from money and effort expended to implement the standards. To do otherwise satisfies only those content with the crisp photograph of the tight bomb pattern.

Second, standards-setting is exclusively technically based and driven. This results in setting very consequential policies in isolation from critical policy considerations. The WQCC has inadequate knowledge of the "facts and circumstances" it must weigh in standards-setting. The EID now makes no meaningful effort to develop this necessary record. Ad hoc responses to ad hoc comments generated by the public hearing **after** the formal proposal do not suffice.

These considerations should be sought out and reviewed in an organized way before the formal proposal stage to create a record to be used by EID to recommend standards whose impacts would be much more clearly defined. This process would answer questions such as: What, in terms that rise above concepts and are west of Dallas, are the water quality benefits to be derived from a standard? Is the cost of applying the standard justified over other competing demands, including other environmental needs?

These considerations must be part of the standards-setting process. It would allow the state and its communities to use what was described in the June public hearing as its "wriggling room" within federal mandates and policies; not to wriggle out of them, but to set rational, priority-based New Mexico policies, tailored to New Mexico needs.

Issues Relating to Stream Flow Variability

Most New Mexico streams have high flow variability resulting from several factors: seasonal changes, weather, drought-wet cycles, and human regulation through dams and diversions. Controlling discharges to maintain standards and to protect stream uses is much more difficult and should call much more for use of discretion and the application of policy judgments than systems with relatively limited variations in flow and levels. A policy question would be, for example, should standards for a discharge be designed—and at what cost—to protect uses in a stream that would be lost from normal and expected cessation of stream flows but for the continuance of the discharge? This question was answered in the affirmative by a quiet standards-making in 1987, with, so far as I know, no analysis of the cost side of the equation and nothing more than the abstract notion that the change would help water quality on the other.

Seasonal Variations and Dechlorination

Because of stream flow variability, waste-load limits for contaminants in discharge permits are set

to allow the standards for the contaminants to be maintained down to a determined critical low flow condition (CLFC). The rationale for the low flow limit is that, at lower flows, the flow conditions alone prevent attainment of standards and designated uses.

The other side of the coin is that, if discharge limits pegged to low flow conditions are enforced year-round, the total assimilative capacity of a stream is not utilized at higher flows and their application "during seasons of abundant receiving water flow may be both costly and unnecessary to preserve stream quality and designated uses." (Quoting from a 1981 EID document entitled *Critical Low Flow Conditions for New Mexico Streams*). Accordingly, the standards have provided that discharge limits can be based on "critical low-flow numeric values ... determined on an annual, a seasonal or a monthly basis, as appropriate, after due consideration of site specific conditions."

While it is encouraging to find this kind of common sense flexibility in the regulations, seasonal variations in discharge limits are for the most part impractical because most wastewater treatment processes can't be turned on or off. However, by limiting the seasonal variations to "non-toxics," the EID now proposes to remove the flexibility for the one parameter I am aware of that appears would allow its use; that is, dechlorination of chlorinated effluent. The 1981 EID document, by the way, does not make a toxic/non-toxic distinction.

First, limiting the use of seasonal variations to non-toxics is the use of a distinction that doesn't make a difference. Lack of dissolved oxygen can be as toxic as chlorine in excess. But, this semantical issue is mooted by the fact that taking advantage of the stream's assimilative capacity at higher flows to allow a higher wasteloading of a contaminant, whether "toxic" or "non-toxic" will maintain stream standards and preclude any toxic effects. Remember, the goal is to remove toxics in toxic amounts.

What would allowing a wastewater plant to turn off the toxic sulfur dioxide gas (used to dechlorinate when stream flows are sufficient to insure standards will not be violated and that there will be no toxicity) accomplish? It would save the sulfur dioxide, save the energy used to produce and transport it, and lessen the dangers associated with production, transportation and use. These are surely all unimpeachable environmental goals.

For those who want the removal of toxics, and in this case chlorine, completely or to the extent practical, without regard to toxic effects or to countervailing considerations, I have these thoughts. To the extent that it is a moral imperative, it is an imperative riding on the back of a tight bomb pattern to the detriment of its own cause. Further, chlorine and its toxicity is a situation of a distinction that in some cases should make a difference regarding its treatment as compared to other toxics. It is not the Cl of chlorine (i.e., the element Cl itself) that is toxic, but rather its highly reactive (corrosive, oxidative) state, which for that reason doesn't last for long. Thus, chlorine in its reactive forms does not build up or bioaccumulate, rather, it dissipates to its non-reactive and relatively non-toxic state, chloride. The standard for chlorine in the Albuquerque reach of the Rio Grande is 0.008 milligrams/liter (mg/L), whereas the standard for chloride is 250 mg/L, a difference in magnitude of more than 30,000 times. The fact that chlorine has limited toxic life in the environment should be weighed in consideration of its actual effects in receiving waters and with how it should be dealt. That is not to say there should be no chlorine standard. Presumably the one that exists is reasonably justified. It is to say that the spatial-durational effects of chlorine wasteloading are different from those of a stable toxic and, therefore, differing treatments can be warranted.

Dry Arroyos and Silver City

A related element is the application of surface water standards to dry arroyos receiving treatment plant discharges. It is not enough for water quality regulations designed to protect "designated," "attainable" and/or "existing" uses to be applied to such discharges solely on the mechanical notion that dry arroyos are "waters of the United States." Are there uses that can exist in the dry arroyo depending upon the standards that are applied? Should it be the discharger's obligation to create them—whatever the cost? To me these questions are not cut and dried issues of environmental progress but rather questions that turn on considerations of common sense and judgment.

The 1988 changes in the water quality standards regulations apply surface water quality stan-

dards to ephemeral streams and dry arroyos when they would be dry but for the regulated discharge. This was discussed at the December 10, 1987 hearing on the proposed changes. An EID witness stated that the effect of the then-proposed changes in the language regarding "Applicability of General Standards," Section 1-102, and addition of a definition of "attainable use," was to make the standards applicable to "ephemeral water courses"—defined to be "a stream or reach of a stream that flows briefly only in direct response to precipitation or snowmelt in the immediate locality." The mechanical effect of this was that a dry arroyo receiving a discharge that could create a use (any subcategory of fishery, subcategory of recreation, domestic water supply, livestock and wildlife watering, or irrigation) would be held to standards to attain the use. The logical consequence of this extension is that the end-of-pipe quality of a discharge had to be sufficient to sustain the uses without the benefit of dilution in receiving water.

Applying standards to those "waters of the U.S." in New Mexico that are dry arroyos with no aquatic life or water uses but for a discharge demands site-specific considerations. Silver City remains the classic case as it discharges its effluent into a dry arroyo some months of the year—the non-irrigation season presumably—and delivers the water for irrigation use during the irrigation season. This requires a discharge permit for its cold weather discharge into Silver City's "waters of the U.S." During the discharge period, I assume there is a surface flow of some several hundred yards. The leap—from if "waters of the U.S.," then standards apply—was in this case made with eyes shut.

Following EID's interpretation of the standards, EPA decided Silver City should dechlorinate its effluent when putting it into the arroyo because the general standards applied to all waters when **any** use for the water exists. And there was a use.

EID determined that the seasonal dry arroyo discharge created a livestock/wildlife watering use —at least when there was water. Therefore, the reasoning went, all general standards applied regardless of the use a particular standard protected. So Silver City's permit required dechlorination designed to protect a fishery use, which of course does not exist in the seasonally dry arroyo, with or without dechlorination. This is not just a tight bomb pattern, this is a transcendent Catch-22 that even Joseph Heller would hold in awe.

But, it's not quite that simple. EID created a "penumbra" protection for aquatic life use just as the Supreme Court created the right to privacy from the "penumbra" of the Bill of Rights—a valid sort of reasoning by the way. EID reasoned that chlorine was toxic to desirable aquatic life not constituting a formally recognizable use that might exist at a lower threshold than a fishery. So, it decided, this hypothetical sub-use was what was being protected. I have no disagreement with this conceptually. But I do have two problems.

First, it was apparently an after-the-fact rationalization of the Catch-22 absurdity.* Second, and more importantly, there is no inkling of whether and how the seasonal aquatic life that dechlorination would allow at the Silver City waters would differ from the status quo and whether any differences would be worth fifty cents environmentally.

The process must lay concepts on a site-specific reality. The moss on a stone under a dripping faucet is aquatic life. Let's dechlorinate tap water. Absurd, yes. And so might be the requirement to dechlorinate the Silver City discharge. For me to judge, I would like to know: In the Silver City situation, what aquatic life exists now? What would exist with dechlorination? Would the difference be consequential with regard to aquatic life value? What effect does the seasonality of the flow have on the aquatic life value? Is the surface flow of sufficient length that there is water downstream from which the chlorine toxicity is attenuated? How much? And, I would want to know the cost of dechlorination.

The point is that standards should not be applied mindlessly to such U.S. waters with no idea

*The proposed standards remove the absurdity of applying a general standard designed to protect a specific use (i.e., fishery) to waters not being able to attain that use for other reasons. That is being done by adding a sentence to the Hazardous Substances paragraph which will read: "This general standard shall be applied to attainable or designated uses in consistence (sic) with the purpose of standards set in Section 1-100 A." (1-102 F.) Section 1-100 A reads: The purpose of these standards is to designate the uses for which the surface waters shall be protected and to prescribe the water quality standards **necessary to sustain the designated uses.** (Emphasis added). Speaking directly, if dechlorination is not needed, and it isn't, to maintain the livestock/wildlife watering use then it wouldn't be required by the general standards. But Silver City is not off the dechlorination hook. Silver City's permit requires dechlorination, and the definition of wildlife watering has been expanded to include foraging as well as drinking. Of what? The aquatic life that conceptually will exist with dechlorination? This fix comports with the philosophy of cutting red tape—lengthwise.

of the water quality benefit, if any, and the relation between the benefit and the cost. The money Silver City spends to vindicate a concept that, as applied, has no value is not available for other bombs.

The ethics of this country and state support water quality standards to discharges into dry arroyos. This has particular value in an arid state like New Mexico. Certainly for example, if Albuquerque were to discharge its fairly constant 70 cfs or so into a dry bed, a significant stream would result that could support uses including a fishery. Further, some contaminants in discharges pose a potential threat to groundwater quality or the surface environment generally without regard to surface water values. Heavy metals come to mind. After weighing the costs, appropriate standards should be applied to such discharges.

A practical solution to address the problem was suggested to me. Rather than a mechanical application of standards in a dry arroyo discharge informally determined by EID staff, each discharge to a dry arroyo should go through a formal designation of uses by the WQCC. This has been done for particular stream reaches and lakes in Part 2 of the standards. This would allow the interests, values, benefits and costs involved to be determined on a case by case site-specific basis through public hearings with presentations by both EID and the discharger. Silver City would be allowed to make known things like the seasonality of discharge, and put some burden on both EID and the discharger to go beyond concepts into site-specific effects, values, and benefits. It would allow policy to be made with due input from those affected by the policies. Equally importantly, it would insure that the real policy considerations not be hidden under tight bomb pattern pieties.

I call attention to an ironic anomaly of the application of the standards to perennial streams as compared to dry arroyos. As discussed above, wasteloading limits in permits for discharge into perennial streams are based on a low flow factor below which the standards are considered non-achievable. Such wasteloading limits are thus based upon dilution available at the low flow. By necessity, application of standards to dry arroyos requires end-of-pipe compliance. Perennial streams administration based on low flow factors ignores the uses the discharge itself might sustain, which is in fact the practical basis for applying standards to dry arroyos. This difference might be good policy but it is not consistent policy nor was it, so far as I know, consciously derived.

Ammonia Standards

Ammonia toxicity, ammonia standards and wasteload allocations for ammonia provide a multi-faceted set of issues relevant to this discussion. Effluent from wastewater treatment plants such as Albuquerque's, not having tertiary nitrification/denitrification treatment, can contain ammonia in amounts toxic to aquatic life. It is a good possibility that if the proposed ammonia standards are adopted, Albuquerque will need to remove ammonia under its next discharge permit. Tertiary treatment of effluent to remove ammonia by nitrification/denitrification is practical, well-established technology.

Albuquerque has estimated that nitrification/denitrification of its effluent would initially cost $60 to $100 million in capital outlays and several million dollars in operating costs each year thereafter.

The above provides a conceptually compelling justification for Albuquerque to move with all due speed to spend that $60 to $100 million for nitrification/denitrification facilities to further the environmental goal of removing toxics in toxic amounts from our waters. In the vernacular of *Catch-22*, this action could be a nice neat tight bomb pattern, the "photo" of which would please those directing policy from upstream.

Let's go beyond the concepts to see their application to reality and ask some questions relating to priorities and benefits. There are numerous overlapping elements to take into consideration to see whether this bomb pattern fits this target.

For the benefit of city professionals who are skeptical as to whether the benefits approach the costs, and the rate-payers who would bear the costs, it would be nice to have discreet knowledge of the aquatic life improvements that ammonia removal from city effluent would allow. Surely a study—even costing some hundreds of thousands of dollars—is warranted if its results would justify even postponement of this large expense. On the other hand, a site-specific study that showed real and substantive aquatic life benefits would go a long way toward justifying the cost to utility professionals, elected officials and the rate-paying public.

These are thoughts I think should be considered. The ammonia wasteload limits would be determined based on a low flow event of one week in two years which could otherwise be higher given assimilative capacity from dilution provided by higher flows. To put it more directly, the ammonia removal process might only be needed on average one week every two years with dilution precluding toxicity the rest of the time. But ammonia removal is not like dechlorination, which requires limited capital investment, and can be turned on and off in response to seasonal flow variations.

Ammonia is like chlorine in having a transient toxicity. Un-ionized ammonia is toxic, but also volatile and reactive, tending toward oxidation to non-toxic states. Thus, in the low flow event with ammonia toxicity, how far down the river before it attenuates to non-toxicity?

Assuming the toxicity in the low flow event (that week in two years) creates a toxic barrier isolating aquatic life downstream from upstream, what is the significance, if on average it is only one week in two years? On this point, another site-specific reality ought to be considered. The low flow event in the Albuquerque reach of the Rio Grande occurs most probably in August or September when there invariably are irrigation diversions upstream of the city discharge point. These diversions would be in the range of 400 cubic feet per second. Arguably, this bypass flow could maintain aquatic life throughout the Albuquerque reach during the low flow event that would render a week-long city-created ammonia toxicity barrier inconsequential.

Finally, in terms of a barrier, in fact, during the time there are very low flows in the Albuquerque reach, there is invariably **no** flow in the river from the Isleta diversion, just south of Albuquerque for some 17 miles to where bypassed water rejoins the river. This break in aquatic life and uses in the Rio Grande floodway would seem to overwhelm the impact of a one-week limited-ammonia toxicity in the Albuquerque floodway reach. The proposed ammonia standard might be valid, but must be overlaid with these kinds of considerations before ammonia wasteload limits for Albuquerque discharge are determined.

In addition to meeting the simple burden of the value to be gained from Albuquerque's removal of ammonia by nitrification-denitrification (at a cost of $60 to $100 million in capital investments and several million dollars in Operations and Maintenance), the value gained needs to be placed alongside other environmental priorities.

The 1990 EID report, *Water Quality and Water Pollution Control in New Mexico* states: "This report has the.....purpose of being a source of basic information on ground and surface water quality and water pollution control programs in New Mexico . . ." The report is instructive, but unfortunately ambiguous and incomplete. What does it suggest regarding ammonia toxicity compared to other water quality problems?

> "Ninety-eight percent of all water quality impairment in New Mexico's surface waters is due to non-point source water pollution. Of primary concern is the effect of non-point source pollution in toxic concentrations in New Mexico's surface waters. With the exception of waters impaired by chlorine and un-ionized ammonia, essentially all known toxic pollutant impairment of surface waters is due to non-point source pollution."

Thus ammonia pollution presumably is at least primarily due to point sources such as wastewater discharges. Let's see how the report further characterizes the ammonia problem generally and for the Albuquerque reach particularly.

Table 9 of the report lists 563.2 miles of rivers not fully supporting designated or attainable uses that is due at least in part to "moderate/minor" impacts from un-ionized ammonia. **Zero** miles had "major" impacts from ammonia. In contradiction to the idea that essentially all ammonia pollution is from point sources, Table 5 states that only 86.1 miles of rivers with non-attained uses was due to point sources: municipal and domestic wastewater. Despite this inconsistency, surely a reasonable conclusion is that any ammonia impact is no more than "moderate."

Let's look at the report regarding ammonia problems in the Albuquerque reach classified by the Water Quality Standards as a limited warm water fishery (lwwf) that might be caused by Albuquerque effluent. Table 2 indicates that 11.9 miles

of river designated lwwf have "partially impaired designated uses" due to point source pollution. Table 5 indicates 86.1 miles of New Mexico rivers are not attaining designated uses due to municipal and domestic wastewater discharges among which the 11.9 miles of affected limited warm water fishing would be subsumed.

Subsequently, Table 10 lists municipal sources as being responsible for 54.7 miles of "major" and 288.5 miles of "moderate/minor" impact causing rivers to "... not fully support designated uses . . ." However, since Table 9 indicates no major impacts from ammonia, any major municipal source impacts would not be from ammonia. These general tables do not amount to a very persuasive case for a $60 to $100 million ammonia problem.

The report goes on to break down specific river reaches corresponding to reaches as designated in the standards. This focuses data from the other tables to the specific reach. The Albuquerque reach is shown as having uses not fully supported for reasons including un-ionized ammonia, but **fails** to list municipal wastewater as the source for any non-attainment of uses in the reach. "Urban runoff/storm sewers, spills and other" are listed as the probable sources. So after winnowing through the tables to investigate the possibility that the ammonia content of Albuquerque wastewater could be the problem source for the Albuquerque reach, this is the result. I would say this failure must be an oversight and that, in fact, EID staff sort of assumes that ammonia is a problem. But Albuquerque is the largest city in New Mexico with the largest wastewater discharge. For the report as a "source of basic information on ground and surface water quality and water pollution control programs in New Mexico" to persuade us that Albuquerque should spend $60 to $100 million for ammonia removal, it must make a better case than this!

Let's look at other problems set out in the report that might take priority over this ammonia problem. Under a heading of "Areas of Special Concern" regarding groundwater, the report states as its first of six listings: "The Albuquerque South Valley, located in the shallow water table zone along the Rio Grande, has problems with groundwater contamination from a variety of causes including septic tanks and a variety of industrial sources." Regarding the same area, the report noted the problem of widespread anoxic conditions and noted:

> "Even if remaining areas were sewered immediately, it might take decades for natural purification processes to eliminate the contamination caused thus far. In the Barcelona area .... septic tanks are responsible for doubling and tripling nitrate levels since 1977 and for contaminating two public wells and 29 private wells with dangerous nitrate levels and excessive total dissolved solids."

Further on the report lists "present and emerging concerns" for prevention and abatement of groundwater pollution. Of relevance here is "the threat to extremely effective programs to prevent groundwater pollution in time of **tight budgets**, which could lead to expensive pollution problems in a few years." (Emphasis added). A relevant "emerging concern" listed for surface waters is "an ongoing problem regarding the discharge of raw sewage from sewer collection lines that break or overflow due to poor maintenance or location." This latter point was likely generated by the two major breaks in the Albuquerque system in the last five years. The result of both these breaks was emergency chlorination downstream of the breaks for disinfection of the raw sewage that most likely retained chlorine toxicity to aquatic life as it hit the river.

Where should Albuquerque's environmental priorities lie? Let's compare the problems:

- un-ionized ammonia in Albuquerque wastewater discharge;
- the continuation of extensive septic pollution in Albuquerque's South Valley; and
- inadequate maintenance of sewer lines.

What are the "temporal/spatial" implications that the EPA report urges using as a basis for setting priorities? The first, ammonia toxicity, is only conceptual, with not even close to compelling documentation. And, once fixed, there will be no residual problems for time and the environment to abate. South Valley septic pollution is beyond concepts—nitrate concentrations doubling and tripling in groundwater in several widely separated

areas that even with immediate removal of the pollution sources will possibly take decades to remediate. Failure to maintain adequately and replace major sewer lines will insure continued toxic episodes on the river.

What will happen to the state and city's "tight budget" with a $60 to $100 million dollar outlay to remove ammonia to protect the river from that low flow event? What effect might it have on the "extremely effective programs" of sewering critical portions of the South Valley to abate and prevent groundwater pollution? And to what extent will this heavy investment to remove ammonia for that low flow event lessen the likelihood of timely maintenance and replacement of sewer collection lines to minimize breaks and discharge of raw sewage?

The 1990 Water Quality Report states that legally, it must include, "an estimate of the environmental, social, and economic impact of restoring and maintaining the chemical, physical and biological integrity of waters within the state." However, it gives no hint as to the costs of something like removing ammonia through nitrification/denitrification of effluent for the City of Albuquerque or anywhere else. City staff has estimated that this would cost from $60 to $100 million. The report does contain a history and projections of wastewater facility construction expenditures in New Mexico. The projections indicate an expected total expenditure in local, state and federal dollars of $74 million for the six years ending 1995. Does it make sense that all this available money be spent for nitrification/denitrification of Albuquerque effluent to prevent ammonia toxicity for the low flow event?

Irrigation

In comments for the record on the proposed standards changes, the Elephant Butte Irrigation District (EBID) staked out its legal position. Its position was that all the water in the system, at least from Elephant Butte Reservoir down, was dedicated exclusively to irrigation, with only incidental and "subservient" recreational uses and no other. EBID cited as preemptive authority, federal legislation creating the Rio Grande Project in 1905, the Rio Grande Compact, and the Mexican Treaty of 1906, which requires annual delivery water to Mexico from Elephant Butte.

> ". . . Thus EBID takes the position that there are no designated uses which require a standard to be set which would impair the irrigation function in the name of recreation or maintenance of a fishery."

EBID's position could probably be considered a proxy for other irrigators.

How do the proposed standards affect irrigation use of water? Irrigators have concerns about some ambiguities in the standards language that push the door ajar—a door most irrigators probably would prefer to keep closed. The standards applicability to irrigation is found in Part 1-102, General Standards, which as would be amended states:

> The occurrence of a water contaminant or a deficiency of dissolved oxygen attributable to .... the reasonable **routine** operation and maintenance of irrigation .... facilities is not subject to these **general** standards.

The emphasized words, "routine" and "general" are proposed to be added to the sentence as it presently exists. Both have raised questions.

Regarding "routine," the question was how it would apply to "reasonable" not necessarily regular irrigation practices that might impact levels of contaminants or dissolved oxygen such as flushing or otherwise removing deposited material from irrigation facilities. The Bureau of Reclamation addressed this concern in comments and recommended clarifying language:

> "Routine operation and maintenance" means those operation and maintenance procedures or activities necessary to continue the functional performance of the facilities but does not include the major reconstruction of diversion dams or storage dams.

Addition of the word "general" raised the question in Bureau of Reclamation comments of whether the intent or effect was to exclude parts 2 and 3 numeric standards from the "reasonable routine" irrigation exemption found in the general standards. Or stated affirmatively, should "routine

reasonable" irrigation activities be subject to parts 2 and 3 numeric standards? This would seem to be so even without the addition of the word "general," but certainly so with it included. Under ordinary construction of meaning, the word "these" in "these general standards" denotes only the general standards, so the word "general" might be considered a clarifying redundancy.

However, an ambiguity lies with inclusion of an exemption to dissolved oxygen standards because there is no "general standard" for dissolved oxygen, whose numerical standards are instead found in Part 2.

Assuming that parts 2 and 3 standards can be used as a basis for regulating irrigation practices, this could be used for requiring rather than urging voluntary implementation of "best management practices" for the abatement of non-point source pollutants such as fertilizers (ammonia, nitrates, phosphates) and insecticides.

The ambiguities should be resolved. The extent to which irrigation activities can be regulated under authority of the standards must be clarified. Any change must also be forthrightly and openly initiated allowing early participation of those affected. Farmers, as others, don't take kindly to being ambushed.

As an interesting sidebar, the well known *Sleeper* case on the law of water rights transfers could have become a precedent with significant adverse effect on attempts to control non-point source pollution. The State District Court enjoined a State Engineer Office ruling allowing purchasers of water rights in Nutritas Creek, historically used for irrigation, to change the use and point of diversion of the water to new uses associated with a ski resort development. The case has been hailed for using "public interest" criteria as a grounds for deciding the case. The court found that allowing the change would result in "the imposition of a resort-oriented economy (that) would erode and likely destroy a distinct local culture ..." and thus be "contrary to the public interest."

In an equally perspicacious ruling in the case, the court also created a short-lived "right to silt" doctrine for New Mexico water law which would, had it survived, been quickly echoed in its corollary: a "duty to erode." Specifically, the court found, as an alternative ground for reversing the State Engineer Office approval, that the protestors (other irrigators) were injured with the transfer because "... water users would be deprived of their first watering ... which benefits the land ... by fertilizing the soil by providing rich silt carried by the waters of the Nutritas Creek."

On appeal, the state's Court of Appeals reversed the lower court, leaving the "public interest" issues as related to water to be resolved in later cases. But the reversing court specifically found that silt was not an element of a water right, pointing out that "to hold otherwise could prevent all upstream users from controlling erosion on their lands for fear that silt would be reduced downstream." *Ensenada Land & Water Assoc. et al. v. Sleeper*, 107N.M.494 (1988).

While the New Mexico District Court in effect imposed a silt requirement on the Nutritas, Section 2-116 of the Water Quality Standards designates that reach as a high quality cold water fishery, a use antithetical to silt deliveries for fertilizer. The law and regulations in their search for the public interest can be like ships in the night.

Water Quality Standards and Water Rights

I will touch briefly on one issue related to possible water rights implications of the Water Quality Standards. The 1988 rulemaking added a definition of "flow" that included the language, ". . . but natural flow cannot be created artificially by point-source discharges of wastewater." The 1990 amendments propose deletion of the definition of "flow." The inference to be drawn from the proposed deletion is not clear but this along with other proposed changes has excited Santa Fe concerns that there might be an attempt to limit Santa Fe's right to stop its discharge in favor of another use of its effluent such as for aquifer recharge.

Santa Fe effluent discharges into an ephemeral portion of the Santa Fe River. The proposed changes redefine the reach of the Santa Fe River with specific designated uses, which include marginal cold water fishery and warm water fishery. The change moves the upper end of the reach from State Highway 22 to the outfall of the Santa Fe wastewater treatment facility. This added reach is a fishery only if adequately treated water flows continuously from this discharge point.

Santa Fe's question is: "Will this mean Santa Fe cannot cut off this discharge if it wants to, because stopping the discharge would make the uses non-affordable?

CONCLUSION

Much of this presentation is polemical in style (a wanton random bombing a la Yossarian) that should not be taken as pretensions of great wisdom or truth. As I stated in my conference talk, my views on this topic are filled with existential doubt, anguish and despair, which doubt... I wish more folks shared. In this discussion I've continuously griped about concepts and perceptions being applied mechanically with little or no attention to their validity in a particular situation. I hope and trust the concepts and perceptions scattered among the polemics have some validity. I think they deserve consideration. Like others, they need testing against reality. Let's remember the goal is not feel-good pretty bomb patterns, but results even if messy and imperfect.