

**PROTEST AGAINST RENEWAL OF
NMED DISCHARGE PERMIT #465
MR. STEVE RAEI PERMITTEE
S&R OPEN PIT SEWAGE LAGOON**

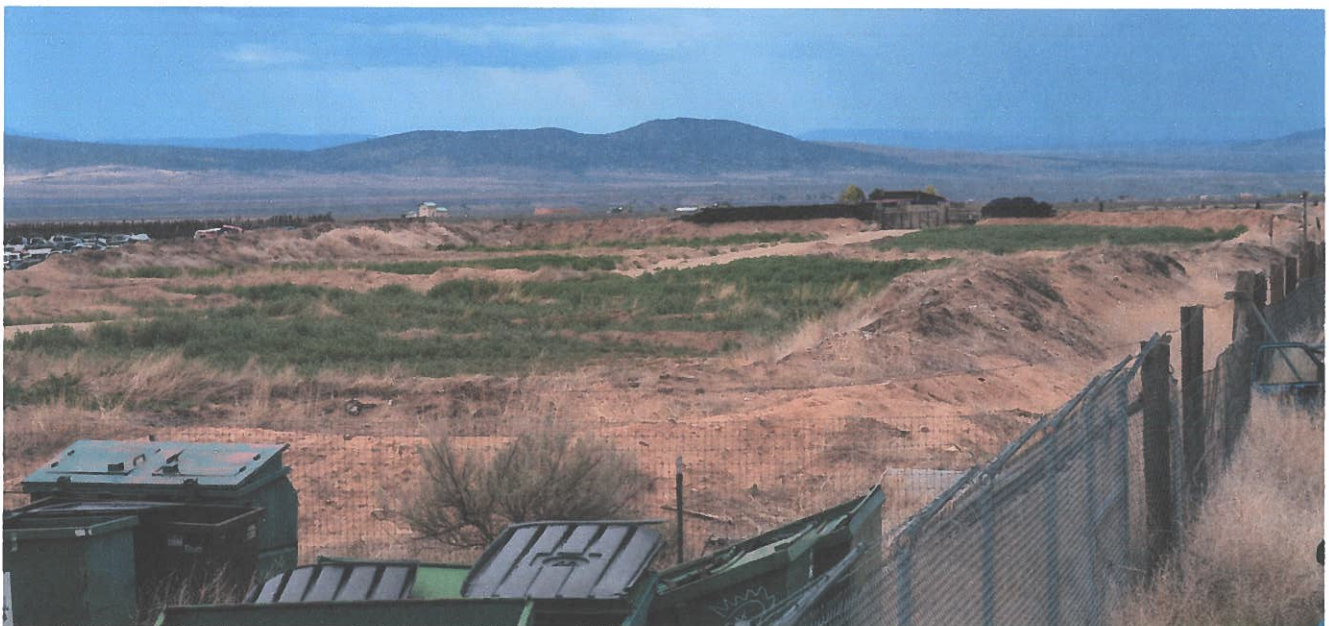
GROUND WATER

JUN 13 2019

BUREAU

**SUBMITTED TO
MR. JASON HERMAN
NEW MEXICO ENVIRONMENT DEPARTMENT
GROUND WATER QUALITY BUREAU
POLLUTION PREVENTION SECTION
1190 ST. FRANCIS DR. SANTA FE NM 87505**

**SUBMITTED BY
THE STAGECOACH NEIGHBORHOOD ASSOCIATION
JOHN DURHAM, BOARD PRESIDENT
PO BOX 368, EL PRADO, NM 87529**



S&R Lagoon JULY 15, 2018

STAGECOACH NEIGHBORHOOD ASSOCIATION
c/o Kristi Vine PO BOX 368
El Prado, NM 87529

June 11, 2019

Mr. Jason Herman, NMED Permit Contact
Ground Water Quality Bureau
1190 South St. Francis Drive, Ste. N4050
PO Box 5469
Santa Fe, NM 87502-5469

GROUND WATER

JUN 13 2019

BUREAU

RE: NMED Discharge Permit #465

Dear Mr. Herman:

BACKGROUND

We are in receipt of the request for a permit extension for S&R Septic's disposal lagoon, located four miles west of the intersection of Highway 522 and State Highway 64, on the north side of Highway 64.

This dumping facility is within the Stagecoach Hills community, represented by the Stagecoach Neighborhood Association (SNA). SNA is the official neighborhood association for this area of approximately 200 ownerships and 95 constructed homes. SNA is registered with Taos County and in one of only two communities in the County that have approved and adopted *zoning overlays* which control both the land uses and the density to which they may be built.

Historically, SNA has opposed further dumping on this site and our *zoning overlay*, approved in 2006, prohibits further such usage. Our concerns are environmental, specifically possible impacts to our precious groundwater and airborne contaminants resulting from lime used as a surface cover. We continue to hold these concerns, especially given the close proximity to Taos Mesa Brewing, a neighborhood brewery/restaurant, and Hotel Luna Mystica, a neighborhood RV and camping park.

Previous attempts by SNA to have this permit renewal denied have been overruled by the state agency, the New Mexico Environment Department (NMED). Once again, SNA respectfully requests that this permit extension NOT be renewed. Although it was requested in August 2012, we have only received partial evidence that past remediation efforts imposed on S&R have been implemented, including limitations on daily dumping and determination of efforts to eliminate airborne contaminants.

The SNA requests that a public hearing be held for public input regarding NMED Discharge Permit #465 for reasons stated within this protest letter.

GROUNDWATER CONTAMINATION

Water is Life

One of the primary concerns of the residents of the Stagecoach Hills neighborhood is the potential impact on the quality and safety of our groundwater from the sewage discharge. The adjacent communities of Lower Las Colonias and Hondo Mesa are also dependent on water from the Shallow Aquifer. The rocks comprising this aquifer consist of basalt and alluvium. Basalt is often fractured and quite permeable, and many of the water wells in these communities produce water from fractured basalt. Gravel channels in the alluvium are also quite permeable. While good permeability means good water production in a well, it also

means that effluent from the open unlined sewage lagoons can move swiftly downward along permeable pathways toward the water table. Faults and associated fractures can also create permeable connections between effluent at the surface and the water table. Furthermore, in this area, water wells are completed by gravel-packing as opposed to cementing in the annulus between the borehole wall and the casing. This is standard, accepted practice, but for wells in the vicinity of an effluent plume, it allows a direct conduit between the effluent and the water table.

The history of the lagoons can be seen in historical images by Google Earth (see the accompanying letter, Appendix A, to NMED by Jerome Hansen). Although the pits were initially designed as functional sewage lagoons, now they appear to be non-functional cesspits where sewage is merely discharged with no corresponding biological breakdown.

Sewage has been discharged since 1987 and this obviously cannot be continued indefinitely, or the aquifer will become infected. The location, speed and direction of the effluent plume from this discharge are critical parameters to understand the risk to the aquifer from this pollution, but they are currently unknown. Even the total amount of discharge into these pits over 31 years is unknown.

Given this lack of information and knowledge, and given the clear danger to the groundwater system posed by this discharge, we believe that approval of the permit would be illogical and imprudent. We therefore respectfully, but strongly, request that the permit be denied, the discharge ceased, and that reclamation of the site and adjacent properties be commenced.

AIRBORNE CONTAMINANTS

We are air. Whatever we do to the air, we do to ourselves.

(We are inspired by the above quote from a geneticist heard on NMAW public radio, "Report from Santa Fe" on 7.2.18.)

Since the NMED does not monitor air quality as it relates to sewage lagoons, we have researched studies by experts and scientists in the field concerning the possibility of airborne contaminants. The evidence is overwhelming.

Contaminants include:

- hydrogen sulfide gas, often produced by the breakdown of waste material
- suspended microbial contaminants
- carbon dioxide, methane, and ammonia
- toxic metals
- All of these contaminants are carried as aerosols in wind and dust. An aerosol is defined as a suspension of fine solid or liquid particles in gas, smoke, fog and mist. To this definition, the EPA has added biological materials such as bacteria, viruses, and endotoxins. Lime treatment has been found to not significantly reduce the number of spore forming airborne bacteria.

Effects of Airborne Sewage Contaminants on Health:

- High levels of these contaminants cause displacement of oxygen in the air
- Gases in the air may cause headaches, coughing, nausea, irritation of mucous membranes, dizziness, fatigue, eye irritation and shortness of breath
- The spread of infectious diseases can be caused by the transmittal of bacteria by water, wind, dust, insects, plants and animals.

In doing research for our letter of opposition in 2012, we discovered from 2002 communications that Mr. Rael, the applicant, stated to Mr. Doug West, the President of the SNA at that time, that he, Steve Rael,

would be willing to close his lagoons and use the Taos Regional Wastewater Facility (TRWF) once improvements were completed (see Appendix B). In July 2018, we were able to tour the facility and view the completed plant improvements. We were told that Mr. Rael is the only hauler in the county who does not use this facility. We found the plant to be clean, odor free and efficiently run with the new Membrane Bio Reactor filtration system. In addition, the plant is inspected by state and federal agencies 1-2 times per year.

In its past usage of the S&R facility, Rael has not exceeded the gallons per day discharge per hauler permitted by the treatment plant and could continue this use at the same rate or more. According to the TRWF, their current daily capacity is 2 million gallons per day with an average daily usage of between 1.1-1.8 million gallons per day. Even on the most busy days that gives an additional capacity of at least 200,000 gallons per day compared to the maximum of 10,000 gallons a day that S&R is approved to dump in its septic lagoon. In the first six months of 2018, S&R reported discharging less than an average of 50,000 gallons per month.

THE PRECAUTIONARY PRINCIPLE

The principle is: When there is reasonable suspicion that harm is occurring or about to occur, we all have a duty to take action to prevent harm, even if some cause-and-effect relationships have not been proven to a scientific certainty. The precautionary approach stands in stark contrast to "business as usual." The precautionary principle is best summed up as "better safe than sorry."

As simple as it may seem, precautionary action represents a completely different approach to the protection of human and environmental health.

CONCLUSION

Within this document, we have attempted to recount a brief history of prior concerns dating back to 2002 (see Appendix C for a more complete history). These concerns remain today and have been updated and reinforced by research into groundwater, including groundwater quality of the Shallow Aquifer and airborne contaminants. These concerns transcend those of our human population, threatening both the landscape and wildlife of our community. Dependent on our precious water aquifer, we remain convinced that it would be improper for the State of New Mexico Environment Department (NMED) to grant yet again, another extension of S&R Septic's permit to dump raw sewage in our community.

Every time we fight this battle, we dig a little deeper into both past research performed by our concerned community members and communication between Mr. Rael and the NMED. To say that we are concerned is an understatement. Official State of New Mexico records indicate that Mr. Rael has had total disregard for both our concerns and those of the State. He has been negligent in a number of ways, from filing for his current extension request 68 days late to an outright ignoring of the State-imposed conditions of approval from 2012. Interestingly, letters of non-compliance reach back to July 28, 2000. Mr. Rael has had 18 years to "make things right"; perhaps knowing that the State didn't have the budget to adequately monitor, he chose to continue to operate in violation of his permit.

As late as October 2018, Mr. Rael had failed to address a number of conditions imposed on him in 2012. These include updated signage, repairs to concrete pads surrounding the cells, failure to provide required information on his semi-annual reports, and inadequate water sampling.

Earlier violations included the number and size of permitted disposal cells, location of disposal cells and the failure to install placards for cell identification, to name a few.

Additionally, research at the State of New Mexico uncovered a complaint from the U.S. Environmental Protection Agency (EPA) from 2006, identifying violations at the site.

As late as September 2018, Rael's crew was witnessed pumping grease trap waste at El Monte Sagrado in Taos. Rael's permit does not permit grease trap dumping. In late September the NMED made a surprise visit to the facility and witnessed a strong smell of septage and a very strong FOG smell.

When confronted by the State, S&R requested extensions to further delay its proof of compliance.

Mr. Rael's continued negligence and flaunting of State requirements make it clear that he does NOT have the best interests of the Stagecoach Hills community in mind, not to mention the protection of our aquifer, so that the businesses and residents that continue to move to our community have a healthy and safe environment. We believe that approval by NMED of an extension of the permit to discharge waste is both illogical and imprudent, especially given the adequate treatment capacity of the Taos Regional Wastewater Treatment Facility.

If the NMED continues to approve S&R's permit, the impacts on us and on our community will be devastating; these consequences range from health impacts to State of New Mexico and applicant accountability. What does the NMED see as the value to the public for this sewage discharge lagoon? How does the welfare of the public benefit?

We respectfully, but strongly, request that this permit application extension be DENIED, the discharge be terminated and that the NMED begin proceedings to have the S&R facility permanently closed and receive the required remediation.

Sincerely,



John C. Durham
President, Board of Directors
Stagecoach Neighborhood Association

Enclosures:

- Appendix A Jerome Hansen letter w/ attachments
- Appendix B 2002 email re Doug West and Steve Rael meetings
- Appendix C Chronological history of S&R Septic Lagoon

cc:

Senator Martin Heinrich
Senator Tom Udall
Representative Ben R. Lujan
Governor Michelle Lujan Grisham
NM Senator Carlos R. Cisneros
NM State Representative Roberto "Bobby" Gonzalez
NM State Representative Susan K. Hererra
Taos County Commissioner Tom Blankenhorn

APPENDIX A

Mr. Jason G. Herman

May 23, 2019

New Mexico Environment Department
Ground Water Quality Bureau
Pollution Prevention Section
Harold Runnels Building
1190 Saint Francis Drive
P.O. Box 5469
Santa Fe, NM 87502-5469
(Ph) 505-827-2713

Dear Mr. Herman,

Re: Renewal of DP-465 S&R Septic Service Discharge Permit

I am a retired petroleum geologist and resident of the Stagecoach Hills Neighborhood, a community on "The Mesa" west of Taos. My career and graduate studies were focused on the Tertiary sedimentary basin fill sequences in the Great Basin (in Nevada and Arizona) which are highly analogous to the basin fill in the Taos region of the Rio Grande Rift. These are the sediments into which the sewage is being discharged. While I want to stress that I am not a hydrologist or a civil engineer, I have deep concerns about the integrity and efficacy of these sewage cells, particularly with regard to contamination of the ground water. My concerns are detailed below.

The permit allows S&R Septic Service to discharge partially-treated sewage to unlined cells on the surface. Apparently, one reason for initial approval in 1987 and continued approval since then is because the aquifer that the surrounding community relies on is greater than 500' deep. The underlying assumption seems to be that the sediments into which the waste water is discharged are relatively impermeable, and therefore the chances of the wastewater and the aquifer coming into contact are low. However, since 1987, with more well data and analysis by UNM and Glorieta Geoscience, researchers [1 and 2], the subsurface geology and hydrology of the wastewater site and surrounding area have been defined better. The presence of thick permeable formations beneath the site, such as members of the Servilleta Basalt calls this assumption into question and suggests that the risk of contamination from discharge into these pits is higher than has been perceived. Furthermore, as more wells in the communities of Hondo Mesa, Stagecoach Hills and Lower Las Colonias access this aquifer, there is a greater risk for contaminated wells and disease now than when the permit was first issued. (Figures 1 and 2, images from 1991 compared to 2016).

Aquifers and Infiltration

There are two aquifers beneath the waste water site: the Servilleta Basalt, and associated fine grained sediments, described below, and Quaternary alluvium, which lies above the basalts. These formations are part of the Shallow Aquifer System [2].

The Servilleta is black basalt, of Pliocene age, which is highly fractured with columnar cooling joints, as seen in outcrops in the Rio Grande Gorge. The tops of individual flow units are vesicular (contain gas bubbles, i.e. they are porous). The Upper and Middle members of the Servilleta are aquifers in the vicinity, a result of the fractured and jointed nature of these volcanic rocks. In this area, water wells have also been completed in channel gravels in associated with the basalt.

Basalts are often highly permeable rocks. I was on a well in Railroad Valley Nevada, where a similar

Pliocene basalt was flow tested at a rate of 292 gal/min. This flow was from a 9.625" borehole in a 70' zone, which yielded many darcies of permeability. Although this is a remarkable flow rate, a quick review of water well logs within 2000 m of the site showed that one well was completed in fractured basalt at 50 gal/ min also from a 70' zone. If the basalt can yield water at this rate, it will also accept water at this rate if the formation is dry. To put this in perspective, if this kind of flow rate (or injection rate) could be sustained, the amount of sewage discharged into the septic system for the last 32 years (500,000 gallons per year for 32 years = 16,000,000 gallons) would be filled in 222 days! If a plume of sewage-contaminated water reaches a zone like this in the Servilleta, it will likely move quickly downward to the water table. Although the section below the sewage pits is ~550' thick, 300' of that section is fractured and jointed (i.e. permeable) basalt (Figure 3, log of a nearby well ~1140 feet from the site). So, rather than insulating the water table from the effluent above, the open joints and fractures in the basalts would more likely allow a "fast-track" of the effluent to the water table.

The ~100' of alluvium above the basalt contains clay derived from the volcanics which is somewhat impermeable, but the deposit has been highly channeled by arroyos (Figure 1). The gravel in these arroyos is very permeable, and if the water table extended higher into the alluvium, these channels would be aquifers. These channels may have formed during the present interglacial period, and they eroded into alluvium deposited during a previous glacial period. Or they may have resulted from tectonic cycles. Either way, the cycles have created a complex series of stacked channel systems. The channels are permeable and vertical downward movement of water is possible. The sewage cells were built across one of the arroyos (see Figures 1, 2 and 8-15) and this may facilitate movement of the sewage discharge into the alluvium. It seems unlikely that the alluvium is much of an impediment to the downward movement of effluent toward the water table.

Based on tritium decay studies of the surface water and groundwater, Drakos and others [2, p.413] determined that "recharge of the shallow aquifer occurs on a time scale of less than 5-10 years." This indicates that the gross permeability of the Shallow Aquifer is relatively large, and like the groundwater, effluent from the cells can also move quickly through the Shallow Aquifer.

In 1987, when these sewage cells were constructed in a remote area of the county, the central question to be answered was, "What is the depth to the water table?" Now, after 32 years of discharge, the appropriate question is, "Are there sufficient aquitards in the alluvium to effectively isolate the surface effluent and pathogens from the water table?" Obviously the discharge cannot be continued indefinitely, or the aquifer will become infected. In 32 years, how much effluent has been discharged into this 4.83-acre area and how deeply has this plume penetrated? These are critical questions that need to be answered before renewal of the permit. Based on a rough analysis of the volume of pore space in the alluvium (Appendix), I believe that 32 years of discharge of effluent into this small area of 4.83 acres has created a plume of pollution that may have entered into the basalt, where it may percolate downward to the water table via open fractures, faults and joints.

The depth of the effluent plume was measured in 2000 by Duke Engineering and Services in a report to NMED Groundwater Quality Bureau [3]. Duke measured the concentration of nitrate (a proxy for the effluent) at various depths at this waste water site and developed mathematic models of the depth and concentration that could be used to predict depth of penetration of the effluent with time. For the sewage cells (the "Taos Impoundment Site") they ran a number of two-part models: a fine-grained layer overlying silt loam, a fine-grained layer overlying loamy sand, a fine-grained layer overlying medium sand, a fine-grained layer overlying coarse sand. Duke used these models to predict the downward percolation

of nitrate over time. I have extracted Figure 17 from this report (Fine grained layer over coarse sand) and have interpolated the 32 year timeline onto this figure (my Figure 4). At 32 years, this model predicts the depth of effluent (i.e. zero nitrates) to be ~84 feet. However, Duke describes the upper 30 feet at the Taos site as "gravelly sand", which is likely to be substantially more permeable than their coarse sand model. Thus it is likely that effluent has penetrated to depths of more than 100, the depth of the Upper Basalt.

Both Duke's sophisticated modeling and my crude pore volume analysis (Appendix) suggest that the effluent may be close to or within the Upper Basalt, where it can move downward quickly to the water table. Thus, I believe that the 500' depth rule used by NMED is arbitrary and does not take into account the permeability of the rock formations below the cells, nor the length of time that the cells have been operational.

Communication Between the Sewage Cells and the Water Table

There are faults in the area that have not been mapped or published (A. L. Benson, oral communication, 2018). These north-trending normal faults can be seen on high resolution aeromagnetic surveys conducted recently by the U.S. Geological Survey. These north-trending faults run through the area approximately 0.75 miles east and west of the sewage cells. Open fractures associated with this fault extend through the Servilleta Basalt and would enable effluent from the cells to move rapidly down to the water table. The trace of the western fault can be seen on Google Earth images (Figure 5). The fault zone is permeable: note the darker color of the fault trace (a result of denser vegetation) and increased amount of purple flowers along the trace near the northern red arrow. The water table dips to the west from the cells, and if contamination reaches the water table and hits this fault, it would spread along the plane of the fault, and expand and complicate the plume.

Contamination of the groundwater below the water table may result from nearby water wells. One well, RG-78139, is 1140' from the cells. RG-78139 was drilled with an 8" bit and cased with 5" SCH 40 PVC pipe. The casing was not cemented to the borehole, leaving a 1.5" ring of void space between the borehole wall and the casing. This "annulus" extends vertically from the surface casing to the water table and to the bottom of the well. The annulus was packed with gravel during the well completion, but this gravel pack is not sufficient to isolate the water table from effluent from above. If effluent reaches this borehole, via the alluvium or the basalt, it has essentially an open conduit to the water table below (Figure 6). The only thing that may keep it from entering the annulus is a thin amount of drilling mud cake in the borehole wall. There are no records of either packers or cement in the well. The well should be monitored closely for signs of communication with the lagoons. Although it is 1140' from the south edge of the cells, an effluent plume only needs to move at a rate of 37 feet year to reach this borehole. Thus it is critical to know where the effluent is in the subsurface, and to know where it is moving. If it is moving toward this well, it should be properly plugged by drilling out the PVC casing and gravel pack, setting 5" steel casing, cementing the annulus to the surface and setting cement plugs in the casing.

Communication between the effluent and the water table through water wells near the sewage cells may be the single biggest threat to the Shallow Aquifer. Plugging and redrilling are expensive operations and it seems logical to stop the discharge and gather the data necessary to evaluate this threat.

History of the Sewage Cells

All of the information about the aquifers would be of little interest if the sewage cells were operating correctly. As you are aware, in a properly operating lagoon, the solids, effluent and pathogens are broken

down by microbial action, and the water is clear and free of vegetation. This water is clean and does not pollute the aquifers. In contrast, these cells are choked with verdant, green weeds that indicate that the waste is being converted into fertilizer instead of being consumed by aquatic bacteria (Figure 7). In addition to the odor and flies, the problem is that the pathogens in the waste have not been consumed and are free to leach downward toward the water table.

A history of the cells can be seen on Google Earth images spanning the interval from 1991 to 2016 (Figures 8-16). **The following observations are based on an examination of these images, and I have not verified or contradicted these observations by an onsite examination.** The onsite examination should be the responsibility of NMED.

Initially, from 1987-1997, it looks like the sewage cells were designed to be functional sewage lagoons with sloping bases in each of the cells to cut down on wave action (Figures 8 and 9). Note the shallow arroyo over which the system was built in Figure 9. By 2005, however the cells were subdivided, and vegetation choked the cells (Figures 10 and 11). A dark spot appears in the 2009 image (Figure 12, arrow), on the central northeast side of the cells, which persists through all of the subsequent images. **During their inspection of the site, NMED personnel should determine whether or not near-surface seepage out of the permit area has occurred and is responsible for this dark spot.** If so, is this a violation of Condition 23 of the permit and is this non-containment a public health hazard? In the 2009 image (Figure 12), note how the cars in the adjoining auto salvage yard are parked to avoid this area. The cells are vegetated. The dark spot persists in the 2010 and 2011 images (Figures 13 and 14). Note the lush green weeds on the 2013 image (Figure 15). Clearly, by 2016, nearly all of the cells were non-functional because of the intense vegetation, and the dark spot persists on the adjacent property (Figure 16). In addition, the hummocky surface of the ground in this area of the dark spot suggests that the ground may have subsided. **During their inspection of the waste water site, NMED personnel should determine whether or not ground subsidence has occurred.** If so, how and why did this subsidence occur, and is it a hazard, and what are the consequences if the subsidence spreads laterally into the sewage cells? If both the seepage and subsidence are determined to have taken place, how are the seepage and subsidence related, what does this mean for the integrity of the cells, and importantly, what does this mean for a connection between the cells and the aquifer? If NMED concludes that leakage and ground subsidence have occurred offsite, either the structural integrity of the cells is gone or they have been used well beyond their original design capacity.

Conclusions

Rather than continue the discharge by renewing this permit, it is time to commence the cleanup operation in accordance with the terms of the permit. At the very least, a moratorium on discharge should be declared and the site studied by a civil engineer and/or hydrologist to ascertain that the structural integrity of the site is intact and that the site is not contaminating the aquifer. Certain critical parameters, such as the depth to the top of the Servilleta, and the location, depth, velocity and direction of movement of the effluent in the subsurface need to be determined, especially with regard to nearby existing water wells and to avoid drilling any future water wells into the path of the plume. I believe that this information could be gathered by geophysical techniques, such as IP (Induced Polarization), CSAMT (Controlled Source Audio Magneto Tellurics) and refraction seismic, which are commonly used in the mining industry. (See <http://zonge.com/solve-underground-problems/geotechnical-environmental/>) Alternatively, this data could be acquired much less expensively through grants from NMED to UNM Taos and the NM School of Mines for graduate studies to properly characterize the geophysical, geological, hydrologic and environmental aspects of the site.

Because of the distinct possibility that any leftover solid matter in these pits contains pathogens, merely

burying the pits would not be sufficient. This effluent will continue to leach downward into the alluvium and volcanics, and eventually reach the water table. Instead, this nitrogen-rich matter needs to be sterilized before burial. One way to do this might be to mix it with sawdust (i.e. carbon) from nearby lumberyards and compost the mixture to temperatures greater than 160 degrees F, and then bury this compost onsite. Another suggestion would be to truck the sludge to a waste water plant where it could be properly disposed. Then, remediate the site and adjoining property with compactible, impermeable clay to prevent further infiltration of the effluent plume, and restore the area to its original contours. Again, recommendations for the environmental mitigation for this site and adjacent property could stem from grants awarded for theses and dissertations to in-state universities.

Many people and businesses on the mesa depend on this aquifer, and this area is likely to be a locus of future growth in the region. Presently, the water quality is good, and with additional droughts forecast by climate models, this groundwater will become many orders of magnitude more valuable than the few dollars saved by not transporting the sewage to the municipal facility. Contrary to assumptions about the impermeability of the basin fill sediments, the alluvium and volcanics are permeable, and the transit time between the surface and the aquifer may be substantially shorter than NMED has assumed. A continuance of the permit increases the chances of contamination of the aquifer. It seems to me that NMED has a window of opportunity to avoid a catastrophic contamination of the Shallow Aquifer in this area. Why compound an already bad problem with continued discharge when the Taos Waste Water Plant can process 1.5 million gallons per day? The discharge is clearly not in the public interest, and if any nearby water wells show evidence of contamination, it's too late. Do the right thing: deny the permit and commence the cleanup. Time is of the essence.

Sincerely,

Jerome B. Hansen

References

1. Benson, A.L. , 2004, Groundwater Geology of Taos County, in New Mexico Geological Society Guidebook, Geology of the Taos Region, Brister, B.S., Bauer, P.W, Read, A.S. and Lueth, V.W., eds. P.420-432.
2. Drakos, P., Lazarus, J., White, B., Banet, C., Hodkins, M., Riester, J, and Sandoval, J., 2004 Geologic Characteristics of Basin-fill Aquifers in the Southern San Luis Basin, New Mexico, in New Mexico Geological Society Guidebook, Geology of the Taos Region, Brister, B.S., Bauer, P.W, Read, A.S. and Lueth, V.W., eds. P.391-404.
3. Duke Engineering & Services, 2000, Evaluation of the Migration of Nitrogen Compounds from Septage / Sludge Land Disposal Facilities: Vadose Zone Predictive Computer Modeling, Summary Report prepared for New Mexico Environment Department, Groundwater Quality Bureau, 81

Appendix

A rough estimate of the depth of the effluent plume in the alluvium, based on pore volume analysis

Given: **Area of site = 4.83 acres (planimetered including potential seepage)**
 43560 sq ft per acre
 7.8 gal per cubic foot

Assumptions: **The site has been filled at a rate of 500,000 gal/ year for 32 years =16,000,000 gal**
 30% porosity in the alluvium
 25% of the alluvium section is effectively permeable
 80% of the effluent has moved downward
 Evaporation = Precipitation

So, **16,000,000 = (Area x 43560) x D x 7.8 x 0.30 x 0.25 x 0.80**

D **= 16,000,000 / (4.83 x 43560 x 7.8 x 0.30 x 0.20 x 0.80)**

D **= 162 feet**

162 feet represents a uniform downward movement of the effluent over the 4.83 acres. If the effluent "fingers" downward, or if the discharge is greater than the permitted capacity, the depth of the effluent plume is even deeper



- Legend**
- Feature 1
 - Line Measure
 - Untitled Path
 - Untitled Polygon

Figure 1. 1991 Image

Note how remote the site was in 1991.

Google Earth
U.S. Geological Survey

Figure 2. 2016 Image

Note the number of homes and businesses in 2016.



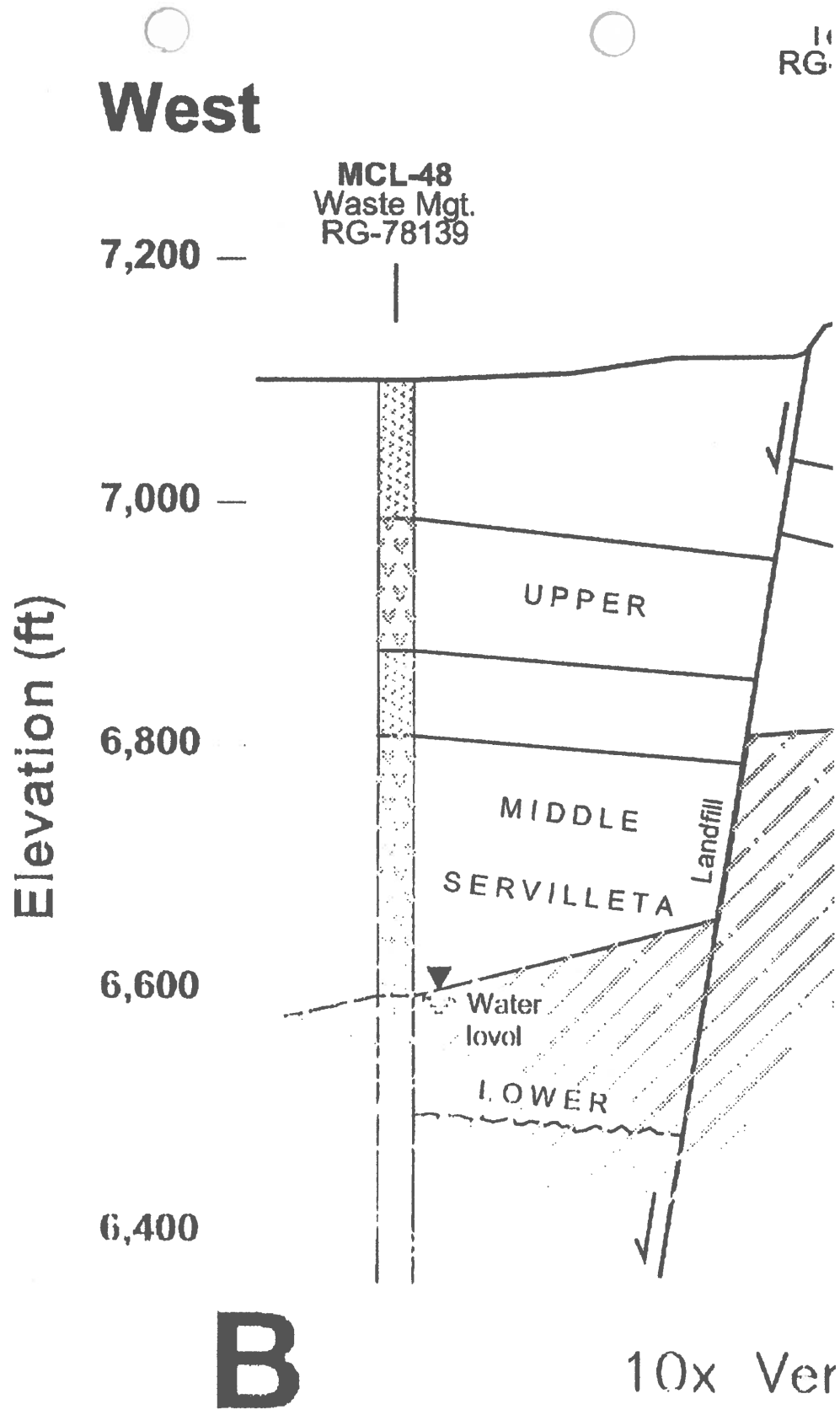


Figure 3. The Waste Mgmt well near the site.
 (From Benson, 2004)

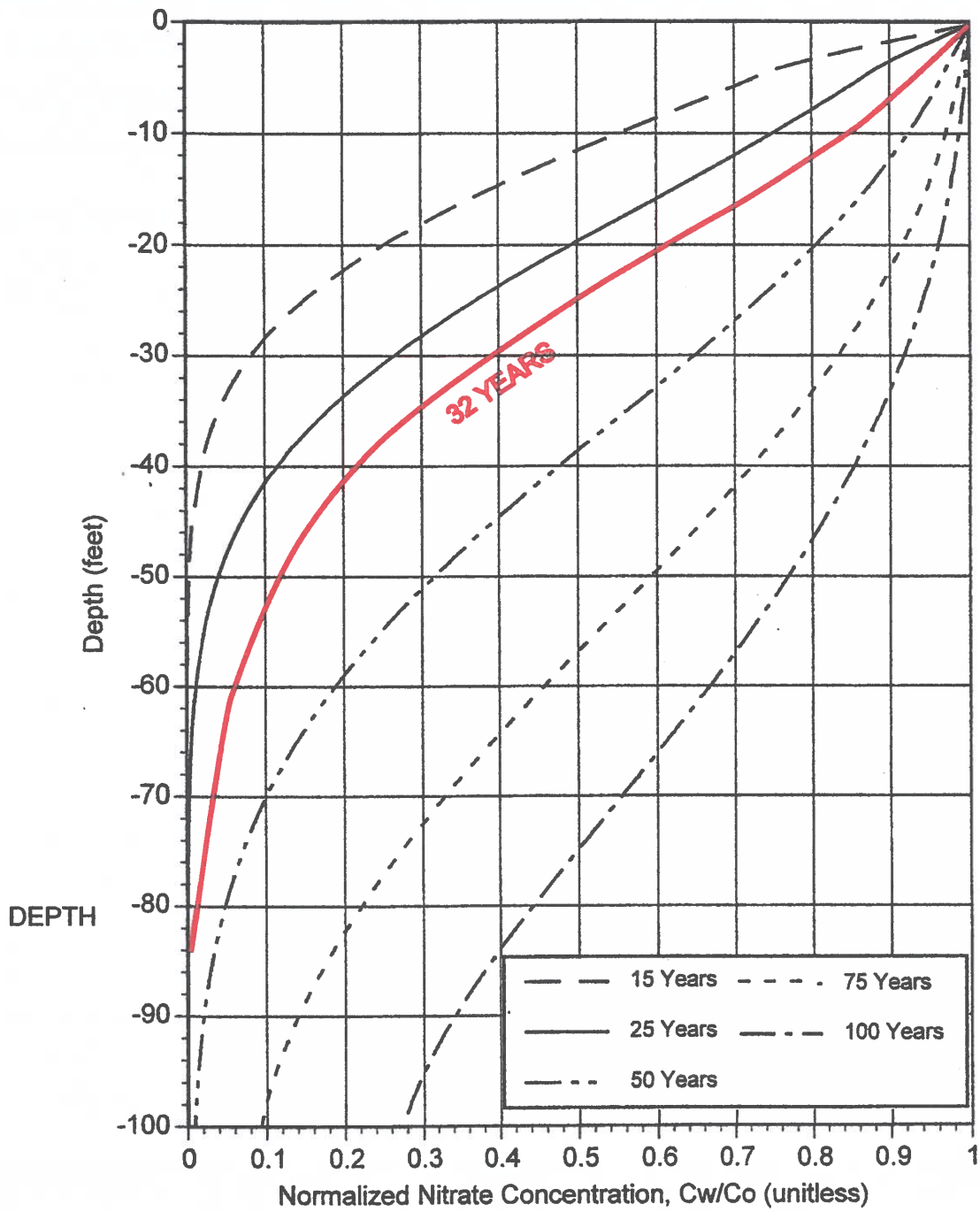


Figure 17. Predicted Normalized Concentration of Nitrate, for Septage Impoundment on a Fine-Grained Surface Layer Overlying Coarse Sand Sediments.

Figure 4. The 32 year line has been interpolated onto the "fine sediment above coarse sand" chart. Effluent depth is ~ 84'. Fine sediment over gravelly sand would be deeper, maybe 100-110'.

Legend

Fault trace

0.75 west of sewage lagoons

Figure 5



4000 ft

Google Earth

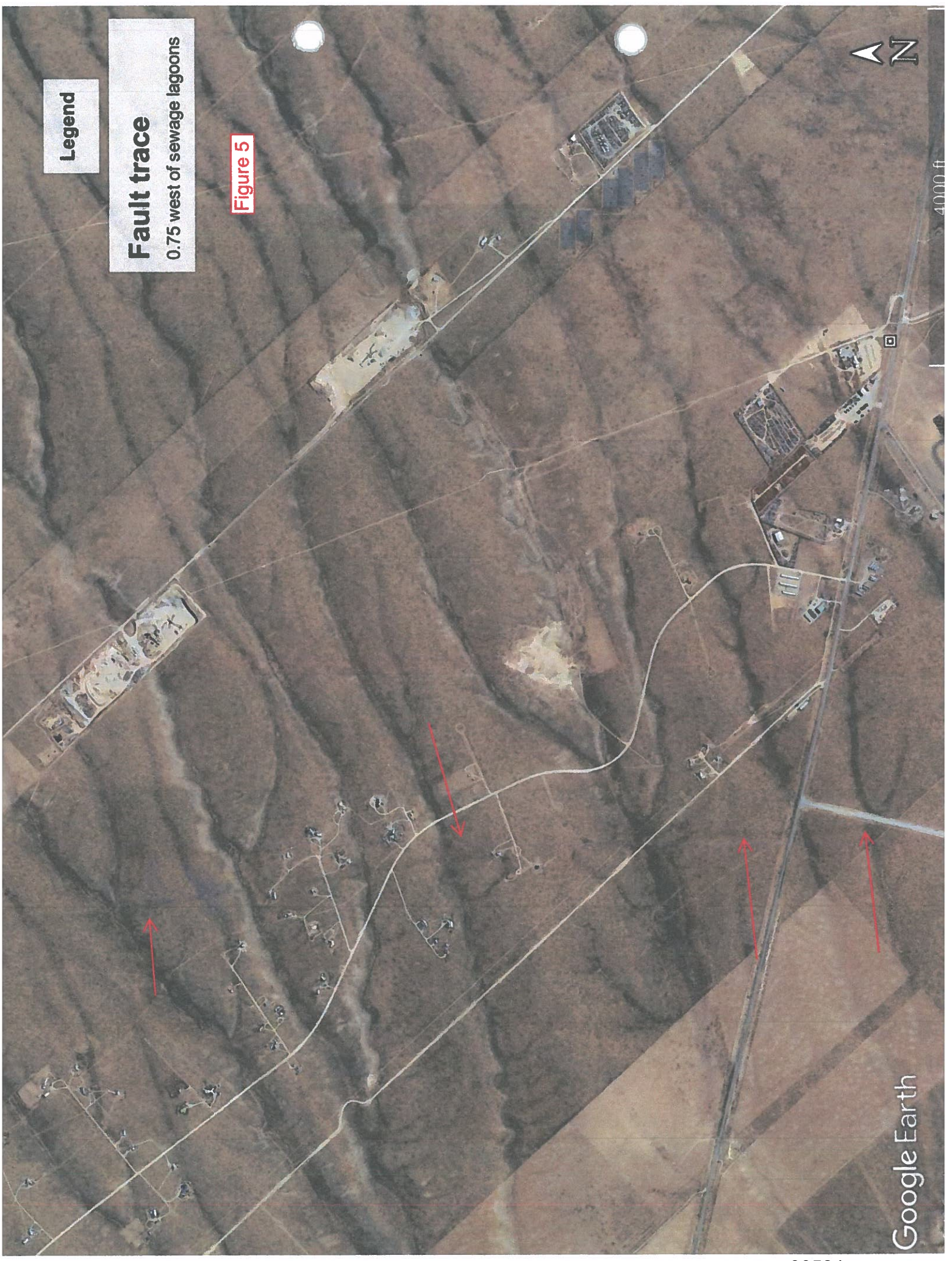
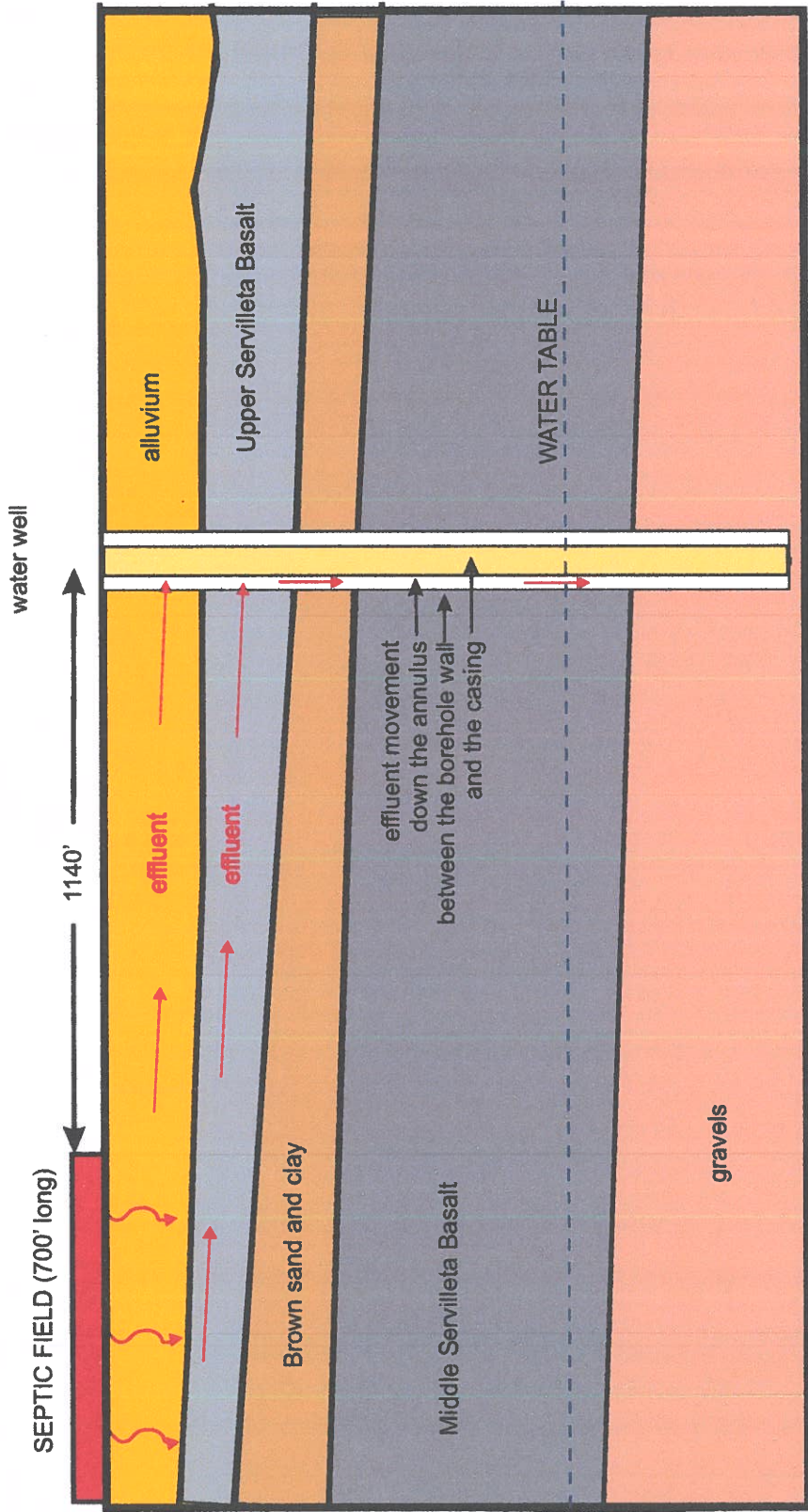


Figure 6 A POSSIBLE CONNECTION BETWEEN THE SEPTIC LAGOONS AND THE WATER TABLE



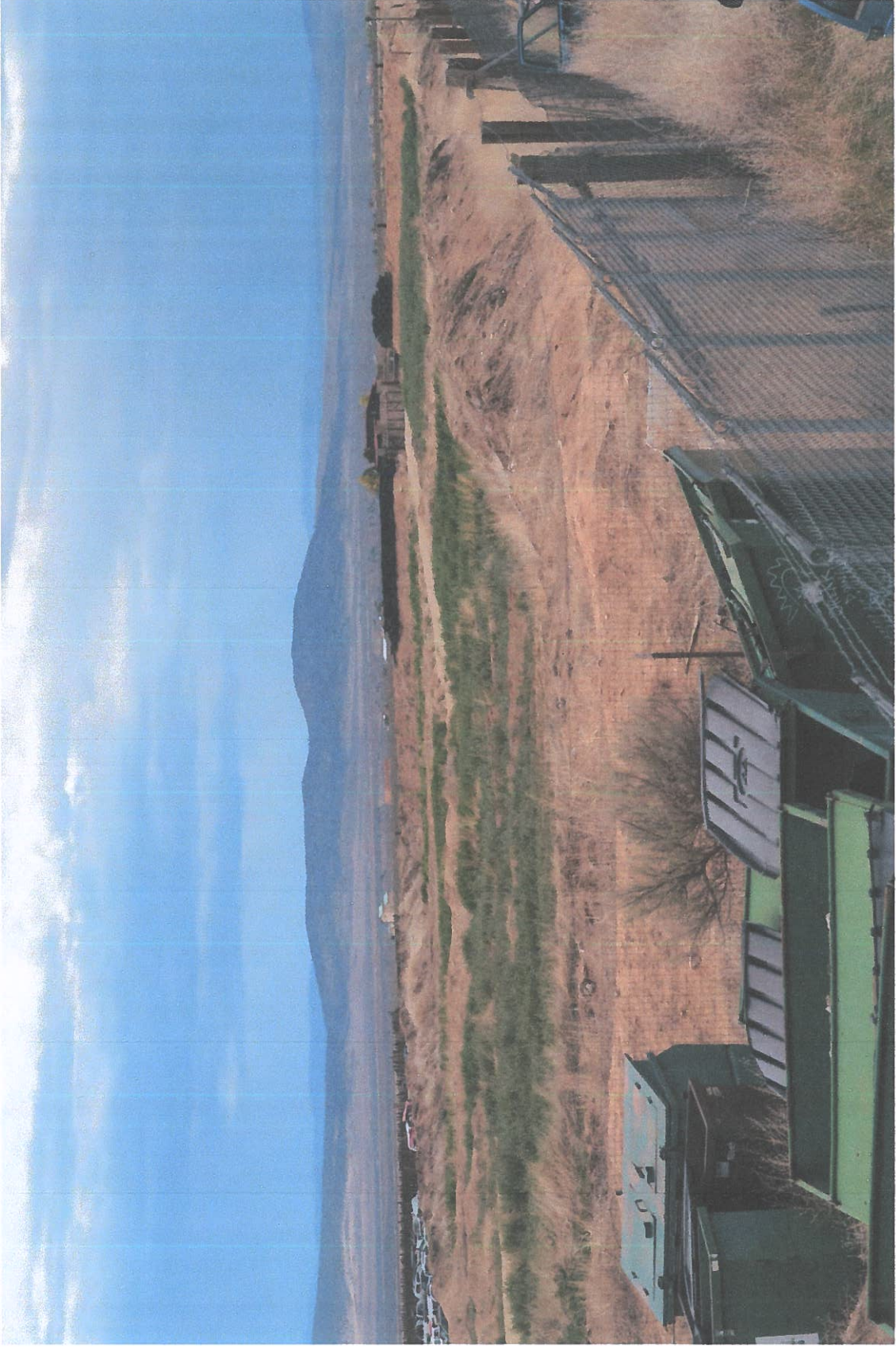


Figure 7. The septic system 7/2018.

Legend



300 ft

S&R Septic

9/1991

Figure 8

sloping base

Google Earth

00527

Legend

S&R SEPTIC

10-1997

Figure 9

sloping base



Legend



S&R SEPTIC

Figure 10

7-2005

Google Earth

00529

Legend

S&R SEPTIC

11-2006

Figure 11



300 f

00530

Google Earth

Image © 2018 DigitalGlobe



Legend



4000 f

S&R SEPTIC

8-2009

Figure 12



00531

Google Earth

Image USDA Farm Service Agency

Legend



4000 f

S&R SEPTIC

9-2010

Figure 13



00532

Google Earth

Image © 2018 DigitalGlobe

Legend



4000 f

S&R SEPTIC

8-2011

Figure 14



00533

Google Earth

Image USDA Farm Service Agency

Legend



300 f

S&R Septic

Figure 15

9/2013

00534

Google Earth



Legend



300 ft

S&R SEPTIC

Figure 16

2016

00535

Google Earth



APPENDIX B

Stagecoach Neighborhood Association (SNA) president, Doug West, meets with Steve Rael of S&R Septic – August and September 2002

9/26/02: At an SNA meeting, president Doug West spoke about five meetings with Steve Rael, including a tour of S&R's Tune Drive septic disposal site. After conversations with Rael, Doug felt convinced that Rael would prefer to dump at the Town of Taos waste disposal site but needed the Tune Drive site for grease disposal (which no longer is permitted there).

Below is an email dated 9/5/2002 that Doug West sent to Linda Thompson, copying the rest of the concerned SNA members, after his first meeting with Rael.

Good Morning Linda,

I met with Steve Rael & his wife Lorretta, and Eric, at Michael's Kitchen Tuesday night. The meeting was positive and might clear the way for us to have an open dialogue with him, perhaps even work constructively together to protect our separate interests,

I told him that we recognize that his business serves a needed function for the Town and County, but that the landowners here also have significant concerns over pollution issues. I offered that we could be an asset to him politically by working to pressure local government to maintain the current rate structure charged for his dumping, and also to enhance the facility and hours that the Town's septic dump is available.

He said, and I am convinced, that he likes using the Town's facility. It is less wear and tear on his vehicles; it is on the way to his home; and it takes the heat off that he is feeling from every quarter whenever he dumps septage on the Mesa. Mainly it is more economical from a business standpoint, and given all the media publicity over the entire issue this last year, he is finding that business and resident customers are not complaining about the extra \$15 load fee. A year ago they were refusing to pay it.

There remains a large issue over holding tank septage. The holding tanks are mainly mobile home folks who have very limited funds and couldn't afford to put in a septic tank where they have parked their trailers. Paying the \$15 is a huge deal to them because they have to have their tanks pumped out so often each year, (say monthly or more), and they truly are living on the edge financially.

In the very near future we need to put pressure on the new County Commission to 1, help fund and subsidize the Town's septage dump and wastewater facility; and 2, have a task force formed to look into ways of also giving aid to the poorer residents who only have holding tanks and can't afford the additional \$15 fee.

Another large issue is grease. He said that his new permit requires him to separate grease from the septage, and that he WILL be dumping that here on the Mesa into long trenches and immediately burying it.

Mainly though, Steve is committed to using the Town's dump station as long as it is affordable to him, and also of course accessible. He is using it almost exclusively already now. BUT, IF THE FEE IS INCREASED, HE'LL BE BACK HERE IN A FLASH. This is because he feels there is a definite limit to what people are willing to pay in addition to his established pumping fees. Apparently Santa Fe And Albuquerque charge about \$45, which he is certain the market will not bear here.

I told him I would report all this back to our group, and that with their approval I would be willing to detail this meeting in some fashion at the hearing. I also told him that I would get back to him after our next meeting and let him know the will of the group before the upcoming hearing. I told him that we would like to find ways to work together while recognizing that we have legitimate concerns and interests as resident property owners, and equally recognizing that he provides a needed service and is working to run a viable business. I think the next step is to schedule another meeting of the committee to decide collectively how to proceed. In the meantime I am going to have a tour of the lagoons with Steve on Monday to see just what the stage of affairs is there.

I'll wait to hear back, Doug

APPENDIX C

A record of VIOLATIONS AND NON-COMPLIANCE Plus other relevant history of the S&R Septic Disposal Permit (DP-465) Prepared by the Stagecoach Neighborhood Association

According to an NMED letter to Rael, S&R's original discharge plan for the Tune Drive site was approved on **April 7, 1987**.

2000 Records: In our SNA file is a letter dated July 28, 2000, from the NMED Ground Water Quality Bureau to Steve Rael of S&R Septic and the subject is: "Letter of Non-Compliance, S&R Septic, DP-465." It says: "This letter is to notify you that you are not operating in compliance with your discharge plan, DP-465, for the S&R Septic approved in a letter to you dated July 28, 1999. The following violations are based on the NMED site inspection on July 10, 2000, conducted by Fred Kalish and Jerzy Kulis of the Ground Water Pollution Prevention Section (GWPPS) and a review of the discharge plan file."

VIOLATIONS pointed out in the letter,

- 1 signs were not mounted every 100 feet as required;
- 2 number and size of disposal cells were not in accordance with the approved disposal plan;
- 3 location of cells not consistent with plan;
- 4 no placards were present identifying the cells;
- 5 the disposal rotational schedule was not in accordance with the plan;
- 6 the required earthen berms were not present around each cell, as required;
- 7 there was no facility perimeter berm nor were there diversion bar ditches at the entrance gate;
- 8 S&R was required to collect and bag dry residual material such as plastics, rags, paper, etc., which could be blown offsite. **The NMED site inspection showed such materials on the site;**
- 9 S&R was required to keep records for each waste pick-up: date, location of pick-up, type of waste, inspections for acceptable waste type, signature of person conducting the inspection, total volume pumped, and disposal location. These records were to be submitted to NMED on May 31 and Nov. 30 of each year. **These records were not kept nor submitted as required.**

On May 31 of each year, S&R was to submit to NMED analytical results of samples collected annually from designated cells and analyzed. The specified procedure: using hand auger or shovel, collect soil samples from six locations, depth of 12 inches and depth of 36 inches. Samples were to be mixed together and analyzed for total Kjeldahl nitrogen and nitrate as nitrogen.

VIOLATION: No analytical results for such sampling had been submitted to NMED.

Twice a year, S&R was to submit to NMED "Land Application Data Sheets" specifying the volume of wastewater discharged to the site and total nitrogen load determined either from assuming 600 mg per liter of nitrogen (average characteristics of septage) or from laboratory analysis. These sheets were to be submitted by May 31 and November 30 of each year.

VIOLATION: No sheets had been submitted to NMED.

JULY 9, 2002 At a public information hearing, representatives from the NMED Groundwater Quality Bureau said that **NMED had no funds to monitor compliance with discharge permits and the haulers "...may need more oversight."** The state had no funds to provide this oversight. A representative of the U.S. EPA in D.C. said "although . . . regulations are in effect and EPA is the agency that forces compliance . . . U.S. EPA has no current programs or resources, or foreseeable plans, to enforce the regulations, presuming voluntary compliance of each operator."

On July 17, 2002, the NMED sent a letter to Steve Rael, indicating "your application of renewal of discharge permit DP-465 . . . is approved, subject to the conditions below."

In July 2008, the SNA again received notification of the permit renewal process for S&R. In phone calls, Brad Reid of NMED stated that the **NMED doesn't have the manpower to monitor compliance more than about once per year, even though S&R has a record of past convictions for non-compliance.**

In July 2012, we again received the NMED's notice of "Discharge Permits Proposed for Approval" in the state, including S&R's permit renewal. John Durham again wrote on behalf of the SNA, citing our reasons why S&R should use the Town of Taos Wastewater Treatment Plant. Back in 2002 the SNA board president, Doug West, had discussions with Steve Rael regarding S&R closing the sewage lagoon and using the Town's disposal site like all the other septic haulers in Taos. Rael said he would do so when the treatment plant had completed its renovations for better waste treatment. The plant completed those renovations in 2012.
But once more, S&R's permit was renewed and he has continued using his private sewage lagoon.

July 2018: We received notices from NMED that the permit is once again up for renewal. On August 3, John Durham and Ron Soskin met with Jason Herman of NMED. In the NMED discharge permit, it states that **applications for permit renewal must be submitted at least 180 days prior to the date the current permit ends (Dec. 27, 2017). An application for renewal was submitted by S&R to NMED on Feb. 22, 2018. It was submitted almost 8 months late with no penalty or order to cease operations at the lagoon until the permit was renewed.**

VIOLATION: NO issue of noncompliance was made by NMED. Sewage lagoon should have been shut down due to having no active permit in place.

Sept. 28, 2018 The NMED does have the ability to seek a restraining order and it has occasionally fined S&R for noncompliance. The permit no longer allows grease dumping and S&R claims they do not haul grease. However, on this date an email string started by Mathew Bogar of NMED reads: Taos field office: "I just witnessed the crew for S&R Septic Service . . . pumping a grease trap at El Monte Sagrado" which is on the town's sanitary sewer. Bogar asks for confirmation that dumping grease in the pit is prohibited. Responses to this email say "you are correct our permit with S&R does not allow for disposal of grease trap waste, only septage and wastewater treatment plant sludge." He will inspect to see whether grease is being dumped at the site.

VIOLATION: August 1, 2018, S&R has not submitted a monitoring report for the first six months of 2018, now due. There is continuing uncertainty at NMED about whether Rael is in fact dumping sludge/grease when he is not allowed to.

On Sept. 7, 2018, Herman of the NMED received a letter from James C. Brockman, atty. for the **El Prado Water and Sanitation District objecting to the renewal of S&R's permit, and requesting a public hearing on this matter. The District (EPWSD) has several major municipal groundwater wells in the vicinity, serving more than 1,000 people.** EPWSD asked that groundwater monitoring wells be installed and that the water be tested and results reported. We do not have Herman's reply to this letter.

On Sept. 13, 2018, Herman emailed Mansker responding to questions about the permit and referring to Michelle Hunter's letter to Rael. He said, "The most recent monitoring summary reported 31,200 gallons of sludge disposed of at the facility and requires the additional sludge characterization for calculation of the loading to each cell." The email doesn't specify whether **Rael is allowed to dump sludge at the facility**, and he seems to go very soft on the reporting requirements that NMED has stated in the past.

Sept. 24, 2018: Herman reports a meeting with Mansker (teleconferencing with Steve and Loretta Rael) called "Response to Notice of Non-Compliance and Hearing Request." Mansker provided a schedule and update of compliance measures and they discussed the definition of sludge. The Rael's requested a 2-week extension for compliance documentation, so NMED made the new deadline 10/10/18. Herman gave them a copy of the EPWSD hearing request.

NMED asked that Raels provide supporting documentation for groundwater levels at 500 feet or deeper. Mansker and Rael "committed to searching for and providing to NMED any additional studies or documentation regarding depth to groundwater and the geology of the facility."

Sept. 28, 2018: Email from Herman to staff members stating that he is on his way to Taos to make a surprise inspection of the site.

Sept. 29, 2018: Report of inspection by NMED, Groundwater Quality Bureau: "NMED arrived onsite at 10:45 am observed the gate to be locked. Signs remain improperly posted and no apparent progress has been made on any of the compliance issues stated in the NONC. The smell of septage and a very strong FOG smell was coming from the facility. Jason Herman called Steve Rael . . . [who] stated he was driving toward Albuquerque and there was no one . . . who could grant access to facility . . . A second inspection to include management will be conducted on Oct. 1, 2018." Herman took photos through a break in the gate material and as they left the site, they saw Loretta Rael in an S&R van on Tune Drive near US 64.

Oct. 1, 2018: Melanie Sandoval and Herman visited the site again. Steve Rael arrived in 20 minutes and opened the gate. Cell 13 had fresh dirt and so Herman took samples. There were new signs with unreadable waste type ID. Herman requested manifests for the previous week, including any pumping of grease trap waste. Photos were taken and samples collected (duplicate samples given to Rael).

Oct. 11, 2018 Herman has emailed John Durham (SNA) a number of reports. In a letter from Michelle Hunter, Chief, Ground Water Quality Bureau of NMED, to Steve Rael dated Aug. 27, 2018, she states "This letter is to notify you that NMED has determined that the above referenced facility **is not operating in compliance with the conditions of the Discharge Permit, the WQCC Regulations and the Water Quality Act.**" She cites failure to submit semi-annual monitoring reports showing compliance with the regulations imposed. Also, she mentions lack of appropriate signage, inadequate construction of concrete splash pads, expiration of the permit (12/27/17) without a renewal application submitted on time; and similar deficiencies observed by NMED inspectors (meeting with Rael and Mansker) at the site on 12/28/17. On 2/19/18, Rael submitted some documents but none of the missing monitoring data.

The semi-annual monitoring reports are due by Aug. 1 and Feb. 1 every year. Hunter's letter further says ". . . to date, NMED **has not received monitoring reports or received incomplete monitoring reports for 2014-2018.**" Rael was told to submit all of the past due reports in their entirety within 30 days of this letter (by Sept. 26, 2018). If a report was missing he was told to explain why and how this would be corrected in the future. "Failure to comply with this letter and the terms of the Discharge Permit may result in the issuance of a formal notice of violation, compliance order, civil penalties, or the filing of an action in district court."

The Raels have again requested an extension of 30 days to provide proof of compliance with State-imposed conditions that accompanied their latest permit extension. This will delay the 30-day window for protest letters to go to the State of New Mexico.

June 2019 Residents of the Stagecoach Hills community continue to witness S&R trucks hauling solid waste to the facility in question, despite the expiration of their permit and an unreasonably long review of permit extension by NMED/Water Quality.

###