Via Electronic Mail

June 5, 2014

Kelly Susewind
Special Assistant to the Director
Washington Department of Ecology
300 Desmond Drive
Lacey, WA 98503-1274
T: (360) 407-6829
E-mail: KSUS461@ecy.wa.gov

Re: Groundwater Monitoring in WA CAFO General Permit

Dear Kelly,

We are writing to formally ask that Ecology include groundwater monitoring as a mandatory condition in the new Washington CAFO General NPDES/State Discharge Permit that your agency is currently developing. As you know, groundwater monitoring is the only way to obtain information necessary to protect groundwater resources in accordance with state law. Therefore, it is imperative that groundwater monitoring be a mandatory condition in the WA CAFO General Permit. After we discovered that a version of the draft permit had been leaked to the Washington State Dairy Federation but had been withheld from us as well as other members of the public and tribal governments, we submitted another public records request and were provided a copy of a draft permit dated January 2014. As you can imagine, it is appalling to see that groundwater monitoring is not a part of the latest iteration of the draft permit. To use the words of Ecology Regional Director Tom Tebb, the most recent draft again “kicks the can down the road” on this issue, which allows medium and large CAFOs to degrade the precious groundwater resources in this state.¹ I hope you agree that such continuing abdication of responsibility on the part of Ecology is unacceptable.

¹ In an April 24, 2009 email to Ecology and Agriculture staff, including yourself, Mr. Tebb said: “Furthermore, I don’t really have a good sense or understanding on where we are headed (as a state and agency) with the lower Valley Groundwater nitrate problem other than to kick the can down the road more. This one is tough for me because it seems like 4 years ago all over . . . when we acknowledged we had a problem but due to priorities chose not to do anything.” (Attachment 1).
The law is clear that Ecology has the obligation “to maintain the highest quality of the state’s groundwater’s and protect existing and future beneficial uses of the groundwater through the reduction or elimination of the discharge of contaminants to the state’s groundwaters.” WAC 173-200-010(4). Given the documented extent of groundwater contamination from CAFOs in the state of Washington, it is illegal, unethical and immoral for Ecology to stand idly by while this rampant pollution continues unabated. Given your background in solid waste management and landfills, we hope that you are able to see the absurdity of having a stringent regulatory regime in place for the management of other solid wastes, see, e.g., WAC 173-304-490 (groundwater monitoring requirements for solid waste handling), while animal waste can simply be placed in a hole in the ground. Is this really the best that we can do? Digging a hole in the ground can hardly be considered “all known and reasonable available technology.” WAC 173-200-050. The absurdity, and illegality, of the different regulatory treatment for animal waste is made all the more apparent by the fact that, according to Tom Tebb, dairy manure stored in a lagoon is stronger and has more contaminants than human waste, which is more strictly regulated than animal waste.\(^2\)

Groundwater monitoring must be included in the Washington CAFO Permit because all lagoons leak. It is a simple principle of physics, known as Darcy’s Law, that describes the flow of a fluid through a porous medium and confirms that all lagoons leak. Indeed, every study that the Washington Department of Ecology has ever conducted on CAFO lagoons illustrate the principle of Darcy’s Law that all lagoons leak. As Tom Tebb, a licensed engineering geologist, geologist, and hydrogeologist, has confirmed: “A lagoon built on earth, if not properly constructed, would leak.”\(^3\) Mr. Tebb also recognized that even manure lagoons constructed with a synthetic liner (there is one such lagoon in this state) would leak into the groundwater.\(^4\) When lagoons leak, the highly toxic animal excreta that is contained within the lagoons discharges into the ground water and drinking water resources of this state. If you monitor the groundwater down-gradient of CAFO lagoons, you will find contamination. Countless studies, and courts of law, have confirmed that incontrovertible fact. Therefore, because all CAFOs are discharging directly to groundwater via lagoon leakage, they all must be subject to the WA CAFO General Permit and be required to conduct groundwater monitoring. Groundwater monitoring is the only way to show the extent of lagoon leakage and the extent of manure over-application that is causing groundwater contamination.


\(^3\) Id. at 41.

\(^4\) Id.
EPA has confirmed that all CAFO lagoons leak. In a September 2012 study, EPA concluded that “[e]ach of these [CAFO] case study sites exhibited ground water contamination by nitrate and/or ammonium. For most sites, this resulted directly from the operation, either through leaking infrastructure piping, leaking lagoons, or land application of CAFO waste, as supported through the monitoring of stable nitrogen isotopes.”5 Another study “has definitively shown that leakage from the manure lagoons is manifested in the shallow aquifer geochemistry at the dairy site.”6 Your own Ecology staff determined that “[l]agoon leakage studies previously conducted by Ecology identify ground water contamination in areas where there are direct discharges to ground water.”7 Ecology found that “[a] lagoon constructed below the seasonal high ground water table is essentially a direct discharge to ground water. The liquid contained in a dairy lagoon is untreated manure. Ecology does not allow the direct discharge of contaminated wastewater or highly treated wastewater into ground water for other activities.”8 Similarly, “[m]anure stored on gravelly soil or shallow, cracked bedrock can pollute groundwater.”9 As early as 1994, Ecology hydrogeologist Dennis Erickson found that leakage from manure storage lagoons affected ground water quality at dairy facilities in Whatcom and Yakima Counties.10 “Near-field monitoring at Edaleen Dairy shows that lagoon leakage is contaminating ground water in the immediate vicinity of Edaleen lagoon. Far-field monitoring indicates that agricultural activities, including land application of dairy waste, are contributing nitrate contamination to shallow ground water.”11 Ecology monitored ground water quality for one year at a new dairy lagoon in Yakima County. Ecology again found that “chloride concentrations in all wells downgradient of the main lagoon increased after the second and third quarters of monitoring (between four and ten months after the main lagoon received wastewater) probably

7 Melanie Kimsey, Ecology Issue Paper, Construction of Dairy Lagoons Below the Seasonal High Ground Water Table (January 18, 2002).
8 Id. at 3.
10 Denis Erickson, Ecology, Effects of Leakage from Four Dairy Waste Storage Ponds on Groundwater Quality (June 1994).
due to leakage from the lagoon.”12 In June 1992, Ecology summarized its findings after monitoring ground water quality for one year at a 12-year-old dairy lagoon in Whatcom County. “In downgradient wells, TSS, chemical oxygen demand, total organic carbon, ammonia-N, total P and chloride consistently exceeded upgradient concentrations, probably due to leakage from the lagoon.”13 Please do not disregard what the science confirms to be true: all lagoons leak.

The data that is being collected by EPA consultants as part of the Safe Drinking Water Act Administrative Order of Consent (“AOC”) in the Lower Yakima Valley illustrates the immediate need for groundwater monitoring as part of the WA CAFO Permit. Deep soil samples required to be taken pursuant to the AOC confirm that, in the words of the dairies' own experts, "residual nitrates are excessive" and are present not only in the top foot, but also three feet below ground surface where the crops can no longer effectively uptake the nitrogen.14 These excessive nitrates have only one place to go, given their mobility in the soil: straight to groundwater. The AOC data further confirm EPA's conclusions in its 2012 study that the CAFO dairies are by far the largest contributor to nitrate contamination in the lower Yakima Valley. The groundwater monitoring results for two sets of quarterly tests in 2013 consistently detect nitrates far in excess of Safe Drinking Water Act public health standards.15 This contamination is putting the community at serious risk. Had these dairies been required to be covered by a WA CAFO General Permit with a groundwater monitoring component years ago (none of them are currently covered by a discharge permit of any kind), this contamination would have been detected and steps could have been put in place to protect public health and the environment.

The consequences of issuing a new CAFO permit without groundwater monitoring are unfathomable given the fact that so many Washington residents depend upon groundwater as their main source of drinking water. Currently over 65% of Washingtonians get their drinking

12 Denis Erickson, Ecology, publication no. 92-e23, Ground Water Quality Assessment, Hornby Dairy Lagoon, Sunnyside, WA (March 1993).
14 Agrimanagement Fertility Report (Field GDS-SU-05 at George DeRuyter & Sons Dairy showed levels of nitrates at 263 ppm at one foot depth, 254 ppm at two feet, and 263 ppm at three feet) (October 9, 2013) (Attachment 3).
15 ARCADIS, Draft Yakima Valley Dairies Quarterly Groundwater Monitoring Data Report (4th Quarter 2013), SDWA-10-2013-0080 at 18 (“Nitrate was detected in 16 [of 25] wells at concentrations greater than 10 mg/L”).
Approximately 725,000 Washingtonians get their drinking water from individual private wells. The vast majority of these people have no clue that their drinking water is potentially contaminated with nitrates and other contaminants from CAFOs. When groundwater monitoring is done, the extent of the contamination becomes readily apparent. On March 6, 2014, Arcadis reported that 48% of drinking water samples from residences near the dairies exceeded the maximum contaminant level of 10 mg/L for nitrate. In the Sumas-Blaine Aquifer in Whatcom County, your agency found that 44% of the wells sampled contained nitrate concentrations exceeding the drinking water standard of 10 mg/L.

At Faria Dairy in Royal City, Washington, Judge Suko of the Eastern District of Washington concluded that “Faria’s manure management practices are the predominant source of the nitrate contamination found in the [groundwater] monitoring wells and correspondingly, local groundwater. These practices include consistent over-application of manure to fields located adjacent to, and nearby, the Dairy.”

Groundwater monitoring has also detected contamination in the aquifer underlying Wilcox Farms, a large chicken CAFO in Roy, Washington. According to Ecology Hydrogeologist John Storman: “I have reviewed the Wilcox Farms submitted Ground Water Monitoring DMRs through the end of 2012 along with the 2012 CAFO NMP Annual Report for Wilcox Farms, Roy, WA. These show a disturbing increase in the Nitrogen and TDS groundwater contaminant levels in some wells monitored at this facility from 2009-2012. The increases suggest that Wilcox needs to improve their nutrient management and applications.”

And that is just the tip of the iceberg. How much more groundwater contamination data needs to be brought forth for Ecology to act to protect groundwater resources as they are currently required to do by law?

We are not alone in advocating that groundwater monitoring is the only effective way to gather information necessary to protect groundwater resources. As your own staff concluded as

---

part of the nitrate studies in the Sumas-Blaine Aquifer in Whatcom County: “Two methods for estimating the nitrogen residual at the end of the growing season, mass balance analysis and post-harvest soil nitrate testing, were not reliable predictors of nitrate concentrations in groundwater. Direct monitoring of water quality at the water table was the only accurate and reliable method for tracking efforts of manure management on groundwater nitrate.”22 The EPA has advised your agency “the state should impose groundwater-monitoring requirements on large livestock operations that are potential significant sources of nitrates to a drinking water aquifer. The specific monitoring system should be designed by a licensed hydrogeologist and include both upgradient and downgradient monitoring.”23 The Washington Department of Health has also recommended groundwater monitoring in recommendations made to the Governor in 2012: “Ensure groundwater sampling around animal operations. This would not only help to [protect] public water systems, but private well owners as well.”24 Please accept and implement the recommendations of your staff and these agencies and include groundwater monitoring in the next iteration of the WA CAFO Permit.

We understand that there may be political consequences associated with your decision to require groundwater monitoring in the WA CAFO General Permit. But politics should not override your legal and moral responsibility to protect the groundwater of this state and the health and wellbeing of those Washingtonians who depend upon groundwater as their sole source of drinking water. Please let us know the status of the draft permit and expected public release date and what else we can do to ensure that groundwater monitoring is required in the new CAFO Permit. We would appreciate if we could set up a time to talk with you about these issues over the telephone. Please let us know when you would be available.

Sincerely,

Andrea K. Rodgers, Of Counsel, Western Environmental Law Center
Charles M. Tebbutt, Law Offices of Charles M. Tebbutt

---

22 Ecology, Nitrogen Dynamics at a Manured Grass Field Overlying the Sumas-Blaine Aquifer in Whatcom County (March 2014).
23 Letter from Dennis McLerran (EPA Regional Administrator) to Ted Surdevant (Ecology Director) and Dan Newhouse (Agriculture Director) (December 4, 2012) (Attachment 4).
24 WA Department of Health, Governor Briefing on Ag/Dairy Waste Issues in the Royal City & Sequim Areas (September 17, 2012) (Attachment 5).
From: Baldi, Josh (ECY)
Sent: Friday, April 24, 2009 11:28 AM
To: Gildersleeve, Melissa (ECY)
Subject: FW: Court backs Ecology’s call on water testing

Looks like you got skipped on the reply ~ jb

Josh Baldi | 360.584.5219
Special Assistant to the Director | WA Department of Ecology

From: Tebb, G. Thomas (ECY)
Sent: Friday, April 24, 2009 11:26 AM
To: Baldi, Josh (ECY); Zehm, Polly (ECY); Wilson, Mary Sue (ATG); Workman, David (ECY); Susewind, Kelly (ECY); Manning, Jay (ECY)
Subject: RE: Court backs Ecology’s call on water testing

I just so you know how absurd this can get, we (WQ-HQ) recently got a letter from the foster pepper attorney (Lori Terry Gregory) quoted in the article below on our recent request for the Deruyter (sp?) Dairy to do additional soil testing that they are now contesting because the general permit said for Eastern Washington soil samples are to be taken at 2.0 feet not 1.0 feet like in Western Washington. This attorney is threatening us with damages because we are concerned about protecting ground water by asking for additional testing and they refuse???

I share your concern and perspectives on the optics. Furthermore I don’t really have a good sense or understanding on where we are headed (as a state and agency) with the lower Valley Groundwater Nitrate problem other than to kick the can down the road more.

This one is tough for me because it seems like 4 years ago all over...when we acknowledged we had a problem but due to priorities chose not to do anything. I sense with the budget climate and higher priorities in the WQ program we may find ourselves in the same spot unfortunately

From: Baldi, Josh (ECY)
Sent: Friday, April 24, 2009 11:10 AM
To: Zehm, Polly (ECY); Wilson, Mary Sue (ATG); Workman, David (ECY); Susewind, Kelly (ECY); Gildersleeve, Melissa (ECY); Tebb, G. Thomas (ECY)
Subject: FW: Court backs Ecology’s call on water testing

Fyi ~ following up on my comment at SMT this morning. I didn’t mean to be flippant (well, ok maybe I did) inquiring about whether this was a good ruling. I’m sure the details and substance support our position, but I literally had to do a double take on the lead sentence. I know we didn’t write it, but in sum: Ecology legally fought the testing of groundwater to assess whether large factory farms are a pollution problem. It’s counter intuitive. While we may be solid on the substance, I contend we have an optics problem ~ jb
In The Matter Of:

CARE, et al.

vs.

Cow Palace, et al.

Deposition of

Thomas Tebb

February 26, 2014
IN THE UNITED STATES DISTRICT COURT

FOR THE EASTERN DISTRICT OF WASHINGTON

COMMUNITY ASSOCIATION FOR
RESTORATION OF THE ENVIRONMENT,
INC., a Washington Non-Profit
Corporation

and

CENTER FOR FOOD SAFETY, INC., a
Washington, D.C. Non-Profit
Corporation

Plaintiffs,

vs.

COW PALACE, LLC, a Washington
Limited Liability Company,

Defendant.

CENTRAL COURT REPORTING 1-800-442-DEPO
Seattle - Bellevue - Yakima - Wenatchee
COMMUNITY ASSOCIATION FOR RESTORATION OF THE ENVIRONMENT, a Washington Non-Profit Corporation and CENTER FOR FOOD SAFETY, INC., a Washington, D.C. Non-Profit Corporation

Plaintiffs,

vs.

D & A DAIRY, a Washington Partnership
and
D & A DAIRY, LLC, a Washington Limited Liability Company,
Defendants.

COMMUNITY ASSOCIATION FOR RESTORATION OF THE ENVIRONMENT, a Washington Non-Profit Corporation and CENTER FOR FOOD SAFETY, INC., a Washington, D.C. Non-Profit Corporation

Plaintiffs,

vs.

HENRY BOSMA DAIRY, a Washington Proprietorship, aka HANK BOSMA DAIRY, aka BOSMA DAIRY, and LIBERTY DAIRY, LLC,
Defendants.

DEPOSITION UPON ORAL EXAMINATION OF THOMAS TEBB
February 26, 2014
Tumwater, Washington

Taken Before:
Laura A. Gjuka, CCR #2057
CENTRAL COURT REPORTING 1-800-442-DEPO
Seattle - Bellevue - Yakima - Wenatchee
APPEARANCES

For Plaintiffs: CHARLES M. TEBBUTT
Law Offices of
Charles M. Tebbutt
941 Lawrence Street
Eugene, OR 97401
541-344-3505
charlie.tebbuttlaw@gmail.com

For Center for Food Safety
ELISABETH HOLMES
Center for Food Safety
303 Sacramento Street
2nd Floor
San Francisco, CA 94111
415-826-2770
Eholmes@centerforfoodsafty.org

For the Defendants: DEBORA K. KRISTENSEN
Givens Pursley
601 West Bannock
PO Box 2720
Boise, ID 83701
208-388-1200
dkk@givenspursley.com

For the Department: PHYLLIS J. BARNEY
Assistant Attorney General
2425 Bristol Court SW
PO Box 40117
Olympia, WA 98504-0117
360-586-4616
phyllisb@atg.wa.gov

Also Present: SARAH NATSUMOTO

CENTRAL COURT REPORTING 1-800-442-DEPO
Seattle - Bellevue - Yakima - Wenatchee
<table>
<thead>
<tr>
<th>EX. NO.</th>
<th>DESCRIPTION</th>
<th>MARKED</th>
</tr>
</thead>
<tbody>
<tr>
<td>44</td>
<td>Notice of Deposition</td>
<td>8</td>
</tr>
<tr>
<td>45</td>
<td>Construction of Dairy Lagoons</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Below the Seasonal High</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Groundwater Table</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>Various E-mails</td>
<td>31</td>
</tr>
<tr>
<td>47</td>
<td>CAFO NPDES and State Waste Discharge General Permit</td>
<td>43</td>
</tr>
<tr>
<td>48</td>
<td>Various E-mails</td>
<td>46</td>
</tr>
<tr>
<td>49</td>
<td>Various E-mails</td>
<td>51</td>
</tr>
<tr>
<td>50</td>
<td>Various E-mails</td>
<td>56</td>
</tr>
<tr>
<td>51</td>
<td>Agenda</td>
<td>62</td>
</tr>
</tbody>
</table>
BE IT REMEMBERED that on the 26th of February, 2014, at 7141 Cleanwater Drive SW, Tumwater, Washington, before LAURA A. GJUKA, CCR# 2057, Washington State Certified Court Reporter residing at University Place, authorized to administer oaths and affirmations pursuant to RCW 5.28.010.

WHEREUPON the following proceedings were had, to wit:

* * * * * *

THOMAS TEBB, having been first duly sworn by the Court Reporter, deposed as follows:

EXAMINATION

BY MR. TEBBUTT:

Q Mr. Tebb, would you please state your full name and address for the record?

A Yes. My name is Gordon Thomas Tebb. Would you like me to spell that or --

Q Sure, please.

A G-o-r-d-o-n, T-h-o-m-a-s, T-e-b-b. My address is 13001 South 1538 PRSW Prosser, Washington 93550. My business address is 15 West Yakima Avenue, suite 200, Yakima, Washington 98902. My phone number at my office is area code (509) 574-3989. Do you need my cell
number?

Q That's good. You can stop right there. I'm just going
to go over some basics first. Have you ever been
deposed before?

A Yes.

Q How many times?

A Probably three times.

Q In what type of cases?

A A variety of pollution cases associated with my
business --

Q So all in your role as an employee of the Department of
Ecology?

A Correct.

Q Can you tell me the names of those cases?

A They were over a decade ago, so I can't. But they
were -- I want to say one was associated with the
Hanford Nuclear Reservation, one was associated with a
water quality permit when I was a water quality section
manager at our Yakima office, I can't recall the case.

Q Have you ever testified at trial?

A I have not.

Q Okay. Just so you know, just to go over some ground
rules -- by the way, I'm Charlie Tebbutt and I represent
Community Association for Restoration of the Environment
and the Center for Food Safety in four actions involving
Research Conservation and Recovery Act claims for imminent and substantial endangerment to human health in the environment due to the groundwater contamination in the Yakima Valley.

Just basic ground rules. Please wait until I finish my question before you answer. Try not to anticipate. Please give audible answers to every question, yeses and nos. Shakes of the head and those sorts of things don't work -- in this situation it's fine because I haven't asked you a question, but when I ask you a question, please give an audible answer. If you don't understand a question of mine, please say that. Otherwise, I will believe that you understood the question and the record will reflect that. If for some reason it is confusing, please say, "I don't understand the question."

You may hear some objections interposed either by your counsel or Ms. Kristensen, the counsel for the defendants in the case. That does not mean that you don't have to answer the question, you still have to answer the question.

This testimony, as you know, is taken under oath. It can be used at trial later, either by itself or for other purposes, such as refreshing recollection or other things.

Any questions at this point?
A No, sir.

Q All right. If you need to take a break, please let me know. That's fine. It's no problem taking a break, you just can't take a break in the middle of a question, while a question is pending, okay?

A I understand.

(Exhibit No. 44 marked for identification.)

MR. TEBBUTT: We are continuing on from yesterday, so we are starting at 44.

BY MR. TEBBUTT:

Q Mr. Tebb, you have seen this document before that's sitting in front of you, Exhibit 44?

A Yes, I have. I believe this was the notice for me to be deposed.

Q Okay. The very last page of this document, Exhibit 44, requests four categories of documents to be produced today. Can you tell me what categories of documents of these four have been produced on the CD that was provided by your counsel Ms. Barker (sic) to us just prior to the start of this deposition?

A I can tell you what we did in terms of trying to produce those documents. I have not been able to actually observe what is on the CD as they were being collected, as I was in travel status. Essentially, I have been here for two days on other business, and so I can tell
Q Okay. Let's do that. Why don't you tell me what you have attempted to produce so far and what --

A Sure.

Q -- still needs to be produced --

A So --

Q -- to the extent you know.

A When we received this request, I notified our public information officer, Roger Johnson. He works with all of us, our staff at the Yakima office, as well as myself and my assistant, and went through a process where we reviewed all of my e-mail files back to the date, I think it was 2005 was the request date backwards, as well as my folder files, which I keep fairly regular correspondence and information as a working file.

Q Is that an electronic folder file?

A No. Those are some of the hardcopies that you have received. So I think those were produced. Also, anything else that I had had in terms of notes and things of that sort, I didn't really have a lot there. So we basically looked at everything I had and tried to produce it in respect to this request.

Q Okay. Do you know what --

A May I get some glasses?

Q Sure.
A I should have brought them to the table, I apologize.

I'm getting a little older to where I need them.

Q I understand and appreciate that.

A Thank you. Excuse me.

Q No problem. Take your time.

A Yeah.

Q So do you know what categories of documents have not been produced yet?

A I do not.

MR. TEBBUTT: I will ask your counsel, Ms. Barker.

MS. BARNEY: Barney.

MR. TEBBUTT: Barney, sorry. What do you know has been produced and what hasn't been produced? We talked about it before at the start of the deposition.

MS. BARNEY: We did. My understanding is that, from Mr. Johnson on the phone yesterday, was that the disks produced today has approximately 80 percent of the material. It contains e-mails responsive to the third and fourth bullet points from a variety of Ecology employees. It's identified on the disk as folder name by those individual's names.

There is additional material in the second disk that we hope will arrive this morning that continues the
production of e-mails. And there is a third disk due
early next week because there was an Ecology employee --
one Ecology employee's parent had passed away and she
was not in the office to do her e-mail searches, and it
also contains the material from Ecology headquarter's
employee Jon Jennings, because he had a great deal of
material in terms of his e-mails, and they were having
difficulty downloading all of that down to the disk
yesterday. So the decision was made to produce as much
as possible on the disk to be here this morning,
arriving this morning, to give you the most material,
but then those two things are following on.

BY MR. TEBBUTT:

Q All right. And may I ask who the employee is who was
not available to produce her file?

A I can respond to that. Her name is Melanie Redding, and
she is a hydrogeologist with our water quality program
here at headquarters.

Q All right. Thank you.

Mr. Tebb, could you please explain your educational
background?

A Sure. I graduated from Toppenish High School in 1978.
I went to Yakima Valley Community College, received my
AA degree. I subsequently transferred to Western
Washington University where I studied environmental
geology. And then I -- at that time I graduated with a bachelor of science degree in 1984. I have pursued a master's of engineering work at Cal Berkeley when I moved down there for employment. I have attended the Dan Evans School, University of Washington just --

Q Let me stop you for a sec. Did you complete your master's?
A I did not.
Q How much of it did you complete?
A I had about a year.
Q And what type of classes did you take?
A Geotechnical engineering and civil engineering. The firm that I worked for was a geotechnical firm and it supplemented my work experience.
Q All right. You were beginning to tell me about some other education you received after the master's work --
A Yeah. Subsequently, as part of my career here at Ecology, I pursued a variety of trainings, particularly most recently several quarters at the University of Washington, Dan Evans School of Business. Actually, the public administration program.
Q All right. Is that the extent of your education?
A It is.
Q I noticed you have some initials after your name.
A Uh-huh.
Q Tell me what "LHG" stands for.
A Sure. I'm a licensed engineering geologist in the state of Washington, also a geologist in the state of Washington and a hydrogeologist. I possess all three of those licenses, license No. 408.
Q And so you are certified in the state of Washington as a hydrogeologist?
A Yes, sir.
Q And an engineer as well?
A No, engineering geologist.
Q Okay. And when did you -- how long have you been licensed as a hydrogeologist in the State of Washington?
A When the state of Washington instituted its hydrogeology, engineering geology, and geology licenses -- I believe it was about a decade ago when they instituted the licensing requirements in this state, I was one of the first -- obviously my license No. 408 represents I was one of the first in the process to be licensed.
Q All right. I would like to go over your work history a little bit with you.
A Sure.
Q Let's start with present and then work our way back.
A Okay.
Q What's your present -- who is your present employer and
what's your job title?

A I work for the Washington State Department of Ecology in our Yakima regional office. I'm the regional director for the Department of Ecology in that office. I have been in that position since 2008.

Q And what position were you in before 2008?

A From 2008 to 2005, I was our water resources section manager in the Department of Ecology central regional office.

Q And were you employed with the Department of Ecology before 2005?

A Yes.

Q In what capacity?

A I have been employed with the Department of Ecology from 2005 to 1998 as a -- excuse me, there is two positions in there. I was a water quality section manager for Department of Ecology, central regional office after my water resources stint, for two years. So I believe that would take us to 2003.

And then from 2003 to 1998 I worked as our shorelands environmental section manager out of our Spokane and Yakima offices.

And prior to that, from '98 to '92, I worked in the Washington State Department of Ecology's nuclear waste program in Kennewick Washington on the Hanford Nuclear
Reservation.

Q Have you had your radiation levels checked now and again?

A Not lately, sir.

Q I don't mean to make light of that.

A Yeah, it's a mess out there.

Q Prior to '92, where were you employed?

A I was employed for the firm that I mentioned. It was Subsurface Consultants, an engineering company out of San Francisco, Washington -- San Francisco, California.

Q What was the name of that?

A It's name was subsurface Consultants.

Q What kind of work did you do for them?

A It was basically I was hired as a geologist, and I worked with a variety of clients, everything from the Navy, working on a degaussing range that they had in the bay, San Francisco Bay, as well as building ponds for water storage in the Napa Valley. So anything kind of soil related or engineering related to soil, that was what I did.

Q And what years did you work for them?

A I worked for them from 1985 to 1992, right after I graduated from college.

Q I just want to ask you about a couple of people who I know used to work at Ecology and ask if they are still
working there. Max Linden?
A Max Linden no longer works for the Department of Ecology.
Q Do you know when he moved on?
A I believe he moved on almost -- I want to say seven to eight years ago.
Q Fair enough. Bob Rayforth?
A Bob Rayforth no longer works for the Department of Ecology.
Q Do you know when he left ecology?
A I would say about five years ago.
Q Have you been involved at all with reviewing the EPA study on groundwater that came out in September of 2012 concerning the Lower Yakima Valley?
A I have read the study. I have not been involved in an official capacity per se.
Q And so when did you first become aware of the contamination of groundwater in the Lower Yakima Valley with nitrates?
MS. KRISTENSEN: Objection, vague.
MR. TEBBUTT: Go ahead and answer.
THE WITNESS: I believe I became aware of it when I was in the capacity as a water quality section manager for the Department of Ecology in the Yakima office.
BY MR. TEBBUTT:

Q Let me just stop you for a second. Try to go slow. The court reporter's fingers only move so fast. So try to go as slow as you can. There is no rush here.

A Okay. It had to do with an enforcement action that we were working with. I can't recall exactly what the enforcement issue was. I can't recall if it was the Port of Sunnyside or some other groundwater -- some sort of surface discharge to ground where we were analyzing contaminants, but I believe we began noticing there was a nitrate problem. And as part of the enforcement work -- now I may have this mixed up -- but the bottom line is that it was an enforcement action that resulted in a penalty. The penalty was used for a study to essentially fund a small study to do some groundwater sampling in the Lower Yakima Valley to determine whether we had a nitrate problem.

Q Do you recall the approximate year?

A I want to say it was in the 2005 era, that era.

Q Okay.

A I know I brought this issue up to our executive management team and all three directors that I worked for in my current capacity.

Q Okay. Do you recall a study done by the Valley Institute for Research and Education on groundwater
contamination in the Lower Yakima Valley?

A Yes, that was the study I was referring to. I couldn't recall the name. It was a man, a professor. It was a small group, and I believe his partner, I don't know if they were married or not.

Q Okay. So that wasn't something that Ecology commissioned; it was commissioned as a result of settlements of other cases, enforcement actions by citizens against some of the dairies in the area; correct?

A Correct.

MS. BARNEY: Objection, misstates. Go ahead.

THE WITNESS: I think that is correct.

BY MR. TEBBUTT:

Q Okay. And so if I told you that that study came out in 2002, would that refresh your recollection when that study actually came out?

A I wouldn't be surprised. I deal with a lot of information and my memory probably isn't that sharp.

Q So did you review that study when it came out?

A Yes, I did.

Q Were you aware of another study that was done by Heritage College at the time, a similar type of study of groundwater contamination in the Lower Yakima Valley?
A: I was aware of it. And I believe the work that we attempted to work with the Valley Institute or the firm that you referenced was to build off that study and to get a wider expansion and notice of the groundwater.

Q: Did you read the Heritage College study?
A: I did not.

Q: Did you assist the Valley Institute of Research and Education, and when I say "you," Department of Ecology, with reviewing quality assurance protocols for that proposed study?
A: Yes. Again, I was acting in the capacity of a manager, so I believe it was my staff. Whether it was Bob or Bob Rayforth or others that were involved in the previous enforcement action, yes, to have data and information that we can use, quality assurance project plans are performed.

Q: Right. So your staff was satisfied that the quality assurance that was part of the -- I will call it VIRE, V-I-R-E -- the VIRE study, it was satisfactory to meet Ecology's standards?
A: That is my recollection. Yes.

Q: And they were not enforcement actions by the Department of Ecology against the dairies; right? It was money that came from citizens' suit settlements; correct?
A: I don't recollect it that way.
Q Sir, I ask -- okay. How do you recollect it?
A I recollect it -- I just wrote down the name of the firm there.
Q I would ask that you not write on the exhibits.
A Oh.
Q If you would like to have a separate pad of paper to write on for your own purposes, please do. But the exhibits --
A I apologize.
Q -- should not -- just so you know, there is handwriting that says "VIRE study 2002/citizen" on the last page of Exhibit 44.
A Sorry.
Q One of those protocols.
A I will scribble over here.
Q Feel free to scribble all you want.
A Okay. To answer your question, I don't recall it exactly as the funding source. I seem to recall it as a penalty that a portion of was used to fund the study. That's how I recollect it.
Q Right. But it wasn't penalties assessed by the Department of Ecology, was it?
A I believe so.
Q Have you had occasion to review other reports done by Ecology employees about groundwater contamination in the
Lower Yakima Valley related to the dairy industry?

Could you be more specific about the nature of the reports? Because they -- what I'm trying to say is, often in the job of permitting different facilities, there are reports that are done to support those permits.

On an individual facility basis?

Yeah.

I'm talking more generally about studies done, scientific studies by the staff at the Department of Ecology about groundwater contamination, and I will start first in the Lower Yakima Valley.

I don't recall a particular study that we have funded. Now, that's not to say that one exists. I don't recall that the environmental assessment program or -- I don't recall a comprehensive study that was performed by our agency in that regard.

Have you reviewed other studies done by the Department of Ecology about groundwater contamination generally in the state of Washington from dairy facilities?

I have reviewed a report associated with the Whatcom nitrate study recently, as it relates to a study that was performed by the Department of Ecology's environmental assessment program. That is probably the freshest on my mind. I deal with a lot of information,
so it's hard for me to answer your question as
accurately as --

MR. TEBBUTT: We will get down to some
more specifics then.

(Exhibit No. 45 marked for identification.)

BY MR. TEBBUTT:

Q Mr. Tebb, you have in front of you Exhibit 45, an issue
paper on construction of dairy lagoons below the
seasonal high groundwater table done by Melanie Kimsey,
a hydrogeologist with the Department of Ecology. Do you
know Ms. Kimsey?

A Yes, I do. I believe Melanie Kimsey is now Melanie
Redding. I believe that was her maiden name. Or if
I -- again, I'm -- this is my understanding.

Q So she now works in the central office in Yakima?

A No. She works in the headquarters office in Lacey.

Q All right.

A For the water quality program.

Q All right.

A And she often does work for the regional offices.

Q Okay. Can you tell me if this study looks familiar at
all to you?

A It does.

Q So you reviewed it before?

A I have.
Q Did you have any input into the either the
development -- well, let's start with the development of
this work.

A No, not specifically.

Q Did you have any input into this study as it was being
produced?

A Just as one of several reviewers. The recommendations
and the options are typical with the type of
construction requirements that I, as a geotechnical
engineer, would recommend for water retention or other
types of facilities.

Q Is it fair to say that you agree with the findings and
recommendations in this study?

A Professionally, I would.

Q Okay. Take a look at the third page of the study down
at the bottom, the last paragraph. Just read it to
yourself, if you would.

Are you all done?

A Yes.

Q Would you agree with the statement that the liquid
contained in the dairy lagoon is untreated manure?

A I would.

MS. KRISTENSEN: Objection, that's not

exactly what it says. It talks about lagoons
constructed below the seasonal high groundwater table,
not all lagoons. So I object that it misstates this
document.

MR. TEBBUTT: We will let the record speak
for itself.

BY MR. TEBBUTT:

Q Would you also agree with the statement that Ecology
does not allow the direct discharge of contaminated
wastewater or highly treated wastewater into groundwater
for other activities?

A I would agree with that.

Q What other activities does ecology prohibit direct
discharge of contaminated water or highly treated
wastewater into groundwater, what kind of activities?

A Activities such as state waste discharge to ground.

Q From what kind of facilities?

A A variety of facilities. It could be everything from an
individual pouring -- or not changing his oil correctly,
to a fairly sophisticated wastewater treatment plant
that applies its wastewater to an alfalfa field.

Q Like a municipal sewage treatment system, for instance?

A Yeah. Typically those discharge to surface water.

Q But there are situations where there are municipal
wastewater treatment holding ponds; correct?

A Correct. And there are also very large scale
Department of Health, I guess, sewage systems, if you
Q Right. And those are not allowed to discharge to
groundwater; correct?

A They are intended to be designed so that the effluent
that is discharged is essentially cleaned through the
biological reaction of the soil.

Q Right. And are you familiar with the strength of
municipal waste, versus the strength of, for instance,
manure waste?

MS. KRISTENSEN: Objection, vague.

BY MR. TEBBUTT:

Q Do you understand the question?

A I believe I do, and I don't have specific -- I don't
have a specific sense of one facility versus manure. I
think manure can be applied in such a manner that it is
taken up in --

Q But let me ask the question more specifically. Raw
human sewage has a certain type of range of contaminant
concentration; correct?

A Yes.

Q And manure from dairy cows has another range of strength
of concentration?

A Correct.

Q Is it fair to say that manure from dairy facilities has
higher strength of contaminant concentration than human
sewage?

MS. KRISTENSEN: Objection, vague. Calls for speculation.

THE WITNESS: I think in the way that it's measured in terms of E. coli counts for nutrients or nitrogen loading, yes. I think because manure often is collected and concentrated in the manner that it is handled, that, yes, it would be at a higher concentration of contaminants.

Q So is it fair to say it is stronger, if you will? It has more contaminants, more nutrients than human waste?

MS. KRISTENSEN: Same objection.

THE WITNESS: Again, I think it has to do with how it is handled and managed and concentrated. I think if it is distributed across the soil --

BY MR. TEBBUTT:

Q But we are not going there, we are just talking about storage in a lagoon, in a liquid sense. We are comparing the human waste that's in a municipal sewage --

A Yes.

Q -- lagoon versus a dairy lagoon. Is it fair to say that the dairy lagoon waste would be stronger than what is in a human waste lagoon?

MS. KRISTENSEN: Objection, incomplete
hypothetical, calls for speculation.

MS. BARNEY: Join.

THE WITNESS: I believe that's correct.

BY MR. TEBBUTT:

Q On the fifth page of Exhibit 44, there is an option 2. It says, and I read, "Construct a non-discharging lagoon by designing a double membrane lined lagoon with a leak detection system. This option achieves containment of the dairy wastewater and creates a non-discharging lagoon." Would you agree with that statement?

MS. KRISTENSEN: Objection, calls for speculation.

THE WITNESS: I'm sorry, could you draw my attention to that statement again?

BY MR. TEBBUTT:

Q Yes, option 2, the first two sentences.

A I would agree with that.

Q And have you -- strike that.

You have been involved in the regulation of dairy waste now for how long, sir, in your capacity with the Department of Ecology?

A Well, being refreshed with the VIRE study of 2002, I would say that in my capacity, both as a section manager and as a regional director, since that time.

Q And these options that are provided in Exhibit 44, which
is a January 18th, 2002 report, provide some options for
the Department of Ecology to regulate certain types of
dairy lagoons; correct?

MS. BARNEY: Objection, the witness hasn't
had the opportunity to read the entire document.

BY MR. TEBBUTT:

Q Would you like to take some time to look at the document
to refresh your recollection, Mr. Tebb?

A I would.

Q Please do.

A Okay.

Q All right. So is it fair to say that this study was
designed to deal with lagoons that are built in or near
a high water table?

A This study looks to be providing an analysis associated
with that phenomena, where lagoons had been built or
will be built in areas of high water table.

Q And Ecology proposed two options for addressing such
lagoons; correct?

A That is correct.

Q Which of the two options, option 1 or option 2, do you
think is more protective of the environment?

A Option 2.

Q And Ecology, also in this proposal, disagreed with the
NRCS proposal for how to deal with lagoons in high water
table areas; correct?

MS. BARNEY: I'm going to interpose an objection here just to state for the record that Mr. Tebb was not issued a 30(b)(6) subpoena. So he is speaking here in his capacity as an ecology employee and to his knowledge as an ecology employee. He is not speaking for -- in an official capacity for the Department of Ecology as it would be under a 30(b)(6).

BY MR. TEBBUTT:

Q Go ahead and answer.

A Could you restate the question, please.

MR. TEBBUTT: Would you mind reading back the question?

(Pending question read back.)

THE WITNESS: That's correct. Well, I would say the author of this study disagreed with NRCS.

BY MR. TEBBUTT:

Q And you reviewed this study, you said?

A Yes.

Q And do you disagree with that statement, that it's --

A No, I do not.

Q On the last page, page 7 of Exhibit 44, there is a list of additional concerns. The second bullet point talks about discrepancy between construction standards for dairy lagoons and standards required for all wastewater
impoundments. Do you agree there is still a discrepancy between dairy lagoons and other types of wastewater impoundments in the state of Washington?

A Yes, I agree with that.

Q So the requirements for dairy lagoons are less strict than for other impoundments; correct?

MS. KRISTENSEN: Objection, vague. Calls for speculation.

THE WITNESS: The dairy lagoons are designed under the NRCS standards.

Q Which you believe are less protective than the Chapter 173-240 WAC standards for other lagoons?

A In my professional opinion as a hydrogeologist and engineering geologist, yes.

Q Are you familiar with -- if you take a look at the last page of Exhibit 44, the sixth reference, "Groundwater Quality Assessment, Hornby Dairy Lagoon, Sunnyside Washington, publication 1992." Are you familiar with that study?

A No, I am not.

Q I have been misspeaking about the exhibit we were just talking to, it's Exhibit 45, that's the Construction of Dairy Lagoons Below the Seasonal High Groundwater Table. It is Exhibit 45, not Exhibit 44, as I have been referring to it. Exhibit 44 is the notice of deposition
and the request for production of documents that we talked about in the beginning of the deposition.

Do you recall a woman by the name of Marci Ogden, Mr. Tebb?

A Yes, I do.

Q And what do you recall about Ms. Ogden?

A I recall that Marci was a homeowner who had high levels of E. coli and bacteria in her well water and was very concerned that the agricultural practices that were occurring adjacent to her home were affecting her drinking water well. And I had numerous conversations with her over the phone and possibly even via e-mail with her about this subject.

MR. TEBBUTT: All right.

BY MR. TEBBUTT:

Q Sir, you have in front of you Exhibit 46 to your deposition. E-mails from 2005 in which you are copied on at least some of them -- actually, all of them -- and one in which you were the author; correct?

A Yes, that is correct.

Q And Exhibit 46, is this the first time that you obtained information about Marci Ogden, if you recall?

A I believe so. That is correct. There may have been a phone call ahead of this discussion.
Q From Ms. Ogden?
A Yes.

Q So you do recall speaking with her on one or more occasions?
A Yes, I do.

Q Was it multiple occasions you spoke with her?
A I believe so.

Q Did you ever meet with her in person?
A I think I did. Again, I --

Q Did you go out to her house?
A I don't think so.

Q On page 2 of Exhibit 46 you made a comment at the top of the page about your discussion with her, that she was concerned about having to drink contaminated water from her well as a result of a neighbor involved in the dairy or feed lot industry. And your statement was, "I tend to agree with her." Do you still agree with that statement today?
A I do.

Q And you made a series of eight recommendations on page 2. Who did you make those recommendations to?

MS. KRISTENSEN: Objection, there is nothing about recommendations. The document says "questions." Misstates this document.

BY MR. TEBBUTT:
Q Well, I will rephrase my question. You listed eight questions for, you say, "We need to think about." Are you referring -- when you say "we," are you referring to the Department of Ecology?

A That is correct.

Q And so those were questions that you asked in your role as a Department of Ecology employee; correct?

A That is correct.

Q Have you come to any answers to those questions as the Department of Ecology?

A We have made some progress on this issue. For example, we have -- there is a formation of the Lower Yakima Valley groundwater management area, which is, I believe, question four on this e-mail that I wrote. I do also believe the agency is in review of the CAFO permit, and I think we continue to work with our other state agencies, particularly the Department of Ag on our respective roles/responsibilities, and that has evolved over time.

Q I'm going to ask you specifically about question three. You say, "What about high nitrate levels? How do we address those?" What has the Department of Ecology done to address those since 2005, if anything?

A Within the current configuration of our CAFO permit and the activities that we have with the Department of
Agriculture and responding to citizen complaints or activities associated with dairy operations, we have -- we continue to work on those issues, which I believe is improving the management of manure. It's not perfect. The relationship and the coordination between our respective agency is it is sort of a delicate dance about who does what when. And I think the staff at the lower level have a better sense of that than I do, now that I'm in a different capacity. But I -- it has always been a challenge.

Q Around this time, around 2005, a responsibility for overseeing the dairy regulatory side was given from Ecology to Department of Agriculture, wasn't it?

A I believe that is correct, yes.

Q So Ecology essentially abdicated its role to the Department of Agriculture to undertake the regulatory structure?

MS. KRISTENSEN: Objection as to the word "abdicated."

THE WITNESS: I would say that the Washington State legislature provided a different regulatory framework from which the Department of Ecology and the Department of Agriculture would work on this issue.

BY MR. TEBBUTT:
Q Did EPA approve that delegation of authority from Department of Ecology to Department of Agriculture?
A I don't believe they have received the Clean Water Act delegation. I believe they are obligated to pursue that, and I don't know the status of that.
Q So you say that the agencies are -- you said generally trying to address the high nitrate levels, but what specifically has Ecology done to forward the ball on reducing nitrate levels since 2005?
A We have -- I don't have a specific program or activity, other than the general activities I have mentioned, to provide.
Q And the groundwater management area, GWMA, the GWMA that you discussed in this e-mail in 2005, did you have discussions with anyone in Yakima County about implementing a GWMA?
A I have had numerous discussions with Yakima County officials, Vern Redifer with Public Works, director, Yakima County. I have probably had conversations with Yakima County commissioners. Mike Lieta, Rand Elliott, and Kevin Bouchey, and their predecessors. I have had conversations with Senator Honeyford, Representative Chandler.
Q Did you discuss the possibility of a GWMA with Yakima County in 2005?
1 A That's entirely possible. I have felt that -- I think
2 as my e-mail illustrates, we have more work to do here.
3 Q Yeah, that's fine. Let's hold off on that for now.
4 In your initial discussions with Yakima County
5 officials, did they decline to enter into any kind of
6 GWMA?
7 A I think there was a funding question and a "How are you
8 going to do this" kind of question that they just
9 weren't prepared to answer at that time.
10 Q Was there political pushback about whether to do a GWMA
11 because of the importance of the dairy industry to the
12 economy in Yakima County?
13 MS. KRISTENSEN: Objection, vague. Lack
14 of foundation.
15 BY MR. TEBBUTT:
16 Q Go ahead and answer.
17 A I think in all aspects of the work that the Department
18 of Ecology does there is always a political factor in
19 our decision-making.
20 Q What did Representative Honeyford tell you about the
21 GWMA? Did you have discussions with him about that?
22 A It's Senator Honeyford. The discussions were primarily
23 around whether the Environmental Protection Agency or
24 the Department of Ecology, a state agency, or the State
25 would have a more leading role. And I believe also I
had this conversation with
Representative Bruce Chandler.

Q What was Senator Honeyford's position, do you recall?
A I believe Senator Honeyford and
Representative Chandler's positions were that the State
should remain the primacy regulatory agency on this
issue.

Q Asking you about question No. 6 on page 2 of Exhibit 46,
you say, "Why is it that we have no direct course of
action (between agencies) to resolve this issue for the
affected public." Has this question ever been answered
to your satisfaction?
A Partially.

Q Okay. Can you explain that for me, please?
A Yeah, as I mentioned, with the formation of the GWMA,
the review of the CAFO permit, and some of the
discussions about the issue of nitrate in groundwater
generally across the state, there is a heightened
awareness, both at the political level and at the
executive level, as well as the technical level. So I
think progress has been made since 2002, and maybe 2005
when this was written, but we are not there yet.

Q Okay. So let's say someone like Marci Ogden were to
call today with the same kind of problem: I have
nitrates in my well in excess of the maximum contaminant
level, what do I do? And she called you, what would you
tell her?

A I would have her contact Yakima County, groundwater
management area, and they actually have a well water
testing program. And depending upon the results of
those tests, an opportunity or an option for drinking
water.

Q For an alternative drinking water source?

A Correct.

Q And there is funding for that?

A There is a limited amount of funding for that.

Q How much funding is available?

A It is part of the recent funding that Senator Honeyford
provided for the groundwater management area. As of the
last biennial budget, the 2013 budget, there was a grant
that was provided for the GWMA, but it went through the
Department of Ecology's contracting process. And so we
have a contract with Yakima County to do this work. And
as an element within that contract, there is a water
quality testing and potential off-the-shelf technology
options. And subsequently, depending upon the issue and
sort of where she falls on a criteria list, an
opportunity for replacement water.

Q Do you know how much the fund --

A I want to say in the order of a hundred thousand
dollars. I don't know the exact figure.

Q Do you know if anyone has applied to that fund at this point?

A I do. I believe we have had two rounds of that process. There was the initial round where we had an extensive mail-out program with Yakima County. We had -- the Department of Health worked with us. We had a variety of workshops that we held throughout the Lower Yakima Valley, both in English and in Spanish. Those workshops were moderately attended.

I think we are continuing to try to improve our outreach and our ways to communicate with the affected community. And then subsequently that funding -- that initial funding went away and then we got the 2013 funding, the formation of the GWMA, and then we reinstituted the program. So there is another round of it.

So we are in the second round of that. And there is similarly an outreach program, there is a website you can go to, you can call a number now, and it's a little bit -- it's much better than it was, let me put it that way.

Q Is that on the Department of Ecology's website?

A No, this is on Yakima County's website.

Q Okay. And so the information about how that process is
working and how much has been funded, is that available
in the Yakima County website?

A Yes, it's not readily available on the website, but that's
information we can get. It's associated with our
contract with Yakima County to move forward and then you
can see how we have divvied out the work tasks.
Q That's information within the possession of Department
of Ecology?
A Yes.

MS. BARNEY: Charlie are you at a breaking
point?

MR. TEBBUTT: Want to take a break?

MS. BARNEY: We have been going for about
an hour.
MR. TEBBUTT: Would you like to take a
break? It's a good time.

THE WITNESS: Sure.
(Short break taken.)

BY MR. TEBBUTT:
Q Mr. Tebb, just for the record, you understand you are
still under oath?
A Yes, sir.
Q A little before the break we talked about Exhibit 45 and
options for protecting groundwater from dairy lagoon
waste. You are both a hydrologist and a soils
scientist, would you agree with that statement?

A I'm a licensed hydrogeologist and a licensed engineering geologist. A soil scientist is slightly a different --

Q As a --

A So the physical properties and how they react to soil and water, as opposed to the biological property, like a soil scientist would be more familiar with.

Q From the engineering point of view, a lagoon built into earth would not be an impermeable lagoon, would it?

MS. KRISTENSEN: Objection, vague.

Incomplete hypothetical, calls for speculation.

THE WITNESS: A lagoon built on earth, if not properly constructed, would leak.

BY MR. TEBBUTT:

Q Is there a way that a constructed lagoon, built into the earth, with only using native soils, could be impermeable?

A Not to my knowledge.

Q It would have to have some kind of synthetic liner in order to potentially keep water from seeping through the bottoms of the lagoons?

A That is correct.

Q And even then there is questions about whether the liners leak?

MS. KRISTENSEN: Objection, calls for
speculation. Incomplete hypothetical.

THE WITNESS: That is correct.

BY MR. TEBBUTT:

Q And that's why the recommendation in Exhibit 45 is to have a double-lined system with a leak detection system between the two liners, correct, to see if those two liners are performing as required?

MS. KRISTENSEN: Objection, calls for speculation. He didn't write this paper. He doesn't know why she included that or not included that.

MR. TEBBUTT: Speaking objections are not necessary.

MS. BARNEY: My objection is it misstates the document, the question.

BY MR. TEBBUTT:

Q You understood the question, didn't you, Mr. Tebb?

A Yes. In my professional opinion, option 2 is probably the most appropriate and protective constructed lagoon at the current industry standards.

Q Now, you were involved with the -- what became the 2006 Concentrated Animal Feeding Operation, NPDES, and State Waste Discharge General Permit, were you not?

A Again, I believe my staff or staff that I worked with were primary authors or the assignment. As a manager, I was involved and provided review, but didn't generate
BY MR. TEBBUTT:

Q You have in front of you Exhibit No. 47, 2006 CAFO general permit, NPDES, and State Waste Discharge Permit; correct?

A That is correct.

Q So you said you were involved in reviewing it; correct?

A That is correct.

Q Do you believe that this permit provides -- strike that. Are you familiar with the original recommendations from the staff about requiring groundwater monitoring around dairies?

A That is correct.

Q And the final version did not have groundwater monitoring, did it, as a requirement?

A It did not.

Q In your professional opinion, is that an adequate response to the concerns you have of the potential for leaking lagoons and over-application of manure to fields and dairy facilities?

MS. KRISTENSEN: Objection, vague. Calls for speculation.

THE WITNESS: In my professional opinion, the option that was identified in Melanie Kimsey's
report, option 2, is the highest protective option. And while this permit doesn't require that, in my professional opinion, if you were to provide an absolutely -- a program that provided minimal, if any, opportunity for leakage, that would be the option to pursue.

BY MR. TEBBUTT:

Q Take a look at page 9 of the permit. There is a section near the top begins, "Process Wastewater Discharges," if you will read that section. Feel free to read the whole section about S1, Effluent Limitations, if you would like. But this is particularly S1(b), "Groundwater Effluent Limitations." It starts at the very bottom of page 8, which is the subtitle of that section, and continues about halfway onto page 9, if you will read that to yourself.

Are you done?

A Yes, I am done.

Q That section talks about, (as read) "Process wastewater discharges, including seepage from waste storage facilities, may not reduce existing groundwater quality except in certain circumstances," and it lists two circumstances; correct?

A That is correct.

Q Can you envision any situation where, number one, an
overriding consideration of the public interest would be served by discharges into groundwater from storage facilities?

A I guess I would answer that if there was some sort of alternative that required protection of human health and/or property. In other words, if there was some sort of natural disaster and there was just no other option, that maybe -- that may fall under this notion of overriding concern for the public interest.

Q But not a daily operation of a dairy lagoon in eastern Washington, that wouldn't fall into the overriding consideration of public interest, would it?

A Not in my professional opinion.

Q Do you know anyone who has ever applied to the Department of Ecology for an exception that fits these two criteria on page 9 of Exhibit 47?

A I personally do not.

Q And under any circumstances, do you agree that discharges may not cause or contribute to a violation of state groundwater quality standards?

MS. KRISTENSEN: Objection, vague.

THE WITNESS: I agree with that statement, if that's the nature of your question.

MR. TEBBUTT: That is the nature of my question.
BY MR. TEBBUTT:

Q Sir, you have in front of you Exhibit 48, a series of e-mails about soil column testing. Can you tell me a little bit more about the context of the questions that you asked in this series of e-mails? Take your time and review it.

A Yes, I have read it.

MR. TEBBUTT: Can you read my question back please.

(Pending question read back.)

THE WITNESS: I think this e-mail is in reference to enforcement action in the nature of a letter of warning to DeRuyter Brothers Dairy, and it was in regards to soil testing to see if in fact the soil was being overly loaded with nutrients and/or nitrate. And my understanding was that we had the authority and the permit to do that as a measure of protection in contrast to groundwater monitoring.

And let me just say that, even if you had a groundwater monitoring well, in my professional opinion, as I understand how nitrate and contamination moves in the soil, it may indicate a problem but may not indicate when that problem was essentially discharged below the root zone. Water really pushes that loading, and what
you will see over time is that loading will move; that is, not taken up through the root zone. It will move through the soil column. And this was a measure of compliance in the vadose zone --

Q V-a-d-o-s-e?

A It's a term of art in the profession where everything above the water table to, I guess, the surface of the soil essentially constitutes the vadose zone. So it was a measure of being able to determine if there was a history of over-application.

Q So the vadose zone is the unsaturated area, essentially; is that right?

A That's correct.

Q So if there is saturation between a surface impoundment all the way down to groundwater, the vadose zones would essentially not be in existence in that situation, in the scientific definition; correct?

MS. KRISTENSEN: Objection, calls for speculation. Beyond the scope of this notice of deposition. He has not been noticed as an expert.

BY MR. TEBBUTT:

Q Go ahead and answer.

A That is my understanding.

Q And you are familiar with the nitrogen cycle?

A Yes.
Q So when manure is applied, it has nitrogen in it, elemental nitrogen?
A (Witness nods head.)
Q And it transforms in the soil and mineralizes to become nitrate that is then usable potentially by crops; correct?
A Correct.

MS. KRISTENSEN: I just want to object. Again, beyond the scope of this deposition. And Charlie is testifying in this case. So object to the form of the question.

MR. TEBBUTT: These are foundational questions, and I don't appreciate your speaking objections.

BY MR. TEBBUTT:
Q So when the nutrient is in the soil and it gets below the root zone or the crop, it has nowhere to go but down towards groundwater; correct?

MS. KRISTENSEN: Objection, calls for speculation, assumes facts not in evidence, incomplete hypothetical.

BY MR. TEBBUTT:
Q Go ahead and answer.
A Yes.
Q So the means for carrying that -- carrying the nitrate
down to groundwater would be water itself, because nitrate is very soluble in water; correct?

    MS. KRISTENSEN: Same objection.

    THE WITNESS: Application of irrigation water or precipitation from the sky would drive material down through the soil column that wasn't taken up by the plant and eventually into the vadose zone, and eventually into groundwater potentially.

    BY MR. TEBBUTT:

    Q So in your e-mail in Exhibit 48, you were concerned about the levels of nitrate in the soil column; is that correct?

    MS. KRISTENSEN: Objection, leading. Assumes facts not in evidence.

    THE WITNESS: I was attempting to provide a request that we would take soil samples to determine the loading of nitrate in the soil column.

    BY MR. TEBBUTT:

    Q So how far down did you want to take the tests?

    A Typically, we would take a deep soil sample up to six feet.

    Q Okay. Why would you do that?

    A Because it would provide a historical record, if you will, of application of -- or, if you will, loading of nitrogen and nitrate in the soil column at various
depths within the soil. It would infer to us either an
over-application on the field or some other problem
essentially.

Q And that would be a more recent history, the six feet
would give you an indication of the more recent history
of applications of manure; is that correct?

A I think that's hard to say exactly because it depends on
how often the field is farmed, the amount of water
that's been on over time. The nitrogen actually can get
locked up if the field hasn't been irrigated or farmed
for sometime. It can just sit there until some time the
field gets cultivated and again the water drives it. So
it's hard exactly to make a one-for-one correlation
there.

Q Sure. But if it's a field that's regularly cultivated,
regularly irrigated, would you be concerned that the
nitrate would be driven down to the groundwater from
those regular activities?

A Yes.

MS. KRISTENSEN: Same objections.

THE WITNESS: Yes, I would be concerned.

BY MR. TEBBUTT:

Q And you could tell by testing in the top six feet, if
you will, what recent activity has impacted those top
six feet, wouldn't you?
A With the normal scenario that we described of a regular cultivated field with a regular irrigation application, that is my assumption.

Q And with manure application records that would be available for the dairy facilities that are required by the dairy nutrient management plans; is that correct?

A That is correct.

(Exhibit No. 49 marked for identification.)

BY MR. TEBBUTT:

Q You have in front of you Exhibit 49, which includes an e-mail from you to other people at the Department of Ecology. And was this an e-mail related to the e-mail that we just discussed in Exhibit 48, at least in part related to Exhibit 48?

A I'm sorry, can you restate the question now?

Q Yes, I will restate the question. Exhibit 48 was involving a letter of warning issued to DeRuyter Brothers Dairy; correct?

A Exhibit 48; yes, that's correct.

Q And this Exhibit 49 includes some reference for the attorney for DeRuyter Brothers Dairy; correct?

A I believe that is correct. I simply -- Lori Terry Gregory, who was a Foster Pepper attorney, I can't recall exactly if she was the DeRuyter attorney or not.

Q But it says right here in the third line about
DeRuyter Dairy; is that correct?

A Yes, that is correct.

Q What I want to ask you about is not so much about that, but the second paragraph where it says, (as read) "I share your concern and perspectives on the optics. Furthermore, I don't really have a good sense or understanding on where we are headed (as a state and agency) with the Lower Valley Yakima County ground nitrate problem other than to kick the can down the road more."

What do you mean by kicking the can down the road more there?

A I felt as a professional geologist, hydrogeologist, and engineering geologist that we could be doing more around providing monitoring and basically understanding of the system in our permit. And as you saw in the Exhibit 47, we did not require groundwater monitoring as part of that.

Q So it is your belief that the Department of Ecology should require groundwater monitoring?

A Yes, I do.

Q And this e-mail was, at least in part, a response to a Washington Court of Appeals decision in CARE versus Department of Ecology where the 2006 permit was upheld by the Court of Appeals; correct? And this is your
response to that?

A Yes, that is my response to that.

Q So in the next paragraph, you say, "This one is tough for me because it seems like four years ago all over, when we acknowledged we had a problem but due to priorities chose not to do anything."

What were the priorities that caused Ecology not to do anything?

A I can't recall exactly, but I think they were probably more focused on storm water and other activities that the water quality program was embarking upon.

Q So essentially Ecology let this problem fester for years because of its failure to adequately require monitoring in the 2006 permit; correct?

MS. KRISTENSEN: Objection, calls for speculation.

THE WITNESS: I believe the Department of Ecology has been wrestling with this issue for a number of years.

BY MR. TEBBUTT:

Q And you believe they were remiss in their duties in not requiring more strict permitting in the 2006 permit; correct?

A In my professional opinion, I would agree. I do not speak for the agency --
Q I understand that. Thank you.

Mr. Tebb, are you familiar with the new draft permit that has been circulating for the CAFO general permit, NPDES, and waste discharge general permit?

A I'm familiar that we are in the process of renewing that permit. I have not read it.

Q Have you seen it?

A I have not.

Q Has your staff seen it?

A That's entirely possible, yes.

Q So are you familiar with it at all; have you talked with anyone about what proposals are listed in the draft permit?

A Not specifically, no. My duties have been more focused on water resource issues over the past several years.

Q Do you know if the present draft permit or have you had any discussions with anyone about whether the present draft permit requires groundwater monitoring?

A I think there have been discussions at the policy level and at the technical level within the agency, but I have not been aware and have not participated in those discussions.

Q Do you know whether groundwater monitoring is a component of the present draft permit as it sits?

A My understanding is that it is not a component.
Q Have you made any comments to anyone within Ecology about the failure to require groundwater monitoring?

A I have not.

Q Why not?

A I believe I have expressed my professional opinion on this matter at the previous cycle. I believe that the Department is working with a sister agency, the Department of Agriculture, to come up with a program that provides that protection in a different manner.

Q Do you believe it is your responsibility, as someone with a professional opinion, that groundwater monitoring is necessary to give your input into the present permit process?

MS. KRISTENSEN: Objection, argumentative, calls for speculation, lack of foundation.

THE WITNESS: If I understand your question to ask should the Department of Ecology ask me as a professional hydrogeologist for my opinion on this matter?

BY MR. TEBBUTT:

Q Yes.

A If they did, I would provide it, and it would be that groundwater monitoring should be required.

Q My question is a little bit different. As a professional manager, as the head of the central office,
as someone who has worked for the Department of Ecology
now for 22 years, do you feel that it's your duty to
give your advice to your staff and to the water quality
management division without them having to ask for it?

A Yes, I would.

Q And you haven't done that yet?

A I have not. I have been remiss in that.

Q I appreciate your honesty, sir.

When EPA released its report on Yakima groundwater
quality in the fall of 2012, you were provided with an
advance copy of that study; correct?

A Yes, I was.

EXHIBIT No. 50 marked for identification.)

BY MR. TEBBUTT:

Q Sir, you have in front of you Exhibit 50. It's an
e-mail from Marie Jennings at EPA, conveying the EPA
groundwater report on the Yakima Valley; correct?

A That is correct.

Q Did you participate in the briefing that EPA did that's
referenced in this e-mail?

A Yes, I did.

Q Did you ask questions of EPA about the scientific
protocols they used in conducting the study and coming
to the conclusions they did in the report?

A I recall at the briefing a robust discussion on a
variety of topics, some of which had to do with the data that was collected, the nature of how it was collected, and the information that was produced.

Q Have you reviewed the study yourself?
A I have read it.

Q Do you take issue with any of the findings in the study?
A I think there are issues of debate around how the Environmental Protection Agency made its conclusions and how it sort of, if you will, its sampling strategy. But I was not surprised by the results or the conclusions of the study.

Q When you say you are not surprised by the results or conclusions, why is that?
A Because of my professional opinion, I believe that groundwater contamination has/is occurring at these locations.

Q Around the dairies?
A Correct.

Q In your opinion, is part of the reason why the 2006 permit was changed from originally having groundwater monitoring required to not having groundwater monitoring required, was the political pressure from the dairy industry a part of that equation?

MS. KRISTENSEN: Objection, lack of foundation. Calls for speculation.
THE WITNESS: I think there were a variety of conversations, both the policy and technical level, around whether groundwater monitoring was the best mechanism to determine whether a grower or a person who is applying the application of manure, how to provide that information to the dairy or to the feed lot.

BY MR. TEBBUTT:

Q Right, but that's not my question. My question is: Were you aware of -- I will rephrase my question -- were you aware of the pressure from the dairy industry on Department of Ecology and Department of Ag to not require groundwater monitoring?

MS. KRISTENSEN: Same objection.

THE WITNESS: I was aware of, I guess I would say, conversations with the dairy industry with our agency. I can't say whether that was pressure or not. I'm not sure the nature of the word pressure.

BY MR. TEBBUTT:

Q Did you have any discussions with anyone in the dairy industry about the permit requirements in 2006 or the 2006 permit requirements?

A Not to my recollection.

Q Have you had any discussions with anyone in the dairy industry about the new proposed permit?

A I have not.
Q: Have you ever had discussions with any of the principals of the Bosma dairies?
A: I have not.

Q: Have you ever met Mr. Henry Bosma?
A: It is entirely possible.

Q: You don't recall specifically?
A: I don't recall specifically. There is a variety of meetings I attend, and they may be on a variety of topics, or I'm engaged with the local community and business and farmers and things of that sort.

Q: Were you in attendance at a meeting with a number of people from Department of Ecology in 1997, shortly after the dairies received notices of intent to sue from CARE, my client, over the Clean Water Act discharges?
A: I was aware of your lawsuit. I was actually the shorelands and environmental assistant section manager at the time, so I was focused on shoreland issues and wetland issues in Eastern Washington as a whole.

Q: So you didn't participate in any of those meetings between Ecology and the dairy industry?
A: No, sir.

Q: Do you know Jay Gordon?
A: Yes, I do.

Q: What interactions have you had with Jay Gordon?
A: Very minor. They are typically at a very high level,
either in conversations with the dairy federation locally or the farm bureau, but they are typically -- he is a participant at a function or at a meeting and it could be a conference, it could be a variety of things.

Q Have you had any discussions with him about the regulation of the dairy industry in the state of Washington?

A Me personally?

Q Yes.

A No.

Q How about the same question with respect to Dan Wood?

A I'm sorry, I don't know --

Q Do you know Dan Wood?

A I don't know Dan Wood.

Q Okay. Do you know Bill or Bob Dolsen?

A It sounds like a dairy family.

Q Dolsen's Cow Palace, do you know them at all?

A I know the Cow Palace and I have heard of the name.

Q But you haven't met them?

A I haven't met them.

Q How about George DeRuyter, have you ever met George DeRuyter?

A I have not met Mr. DeRuyter but I have probably met relations of DeRuyter.

Q Have you met Dan DeRuyter, his son?
A I believe so.
Q Do you know in what context?
A I believe he is a participant on the Groundwater Management Area as an advisory board member.
Q Do you participate in the Groundwater Management Area?
A I do; I'm an alternate.
Q So you are not there all the time?
A I try to be there as much as I can, but I'm not there all the time.

MR. TEBBUTT: Why don't we take a short break. We are having some more copies made of some documents today. I'm getting close to done.

MS. BARNEY: Okay.

(Discussion held off the record.)

MR. TEBBUTT: Let me go on the record right now and we will take care of this before I forget, that if there are documents that we receive later after this deposition is concluded this morning, I would like to reserve my right to ask Mr. Tebb some additional questions about documents that we receive after we conclude this deposition today.

MS. BARNEY: Well, Ecology would object to leaving the deposition open, even for that limited purpose, but maybe we could -- there might be a way that we could have a written, perhaps, response.
MR. TEBBUTT: What I would suggest is that we just continue by telephonic deposition so that we can not have to appear in person, we can just ask some follow-up questions, if any, telephonically.

MS. BARNEY: On specific documents and for that limited purpose?

MR. TEBBUTT: Yes. Not that it's left open for us to go back, but just for documents that we receive after -- that we receive after the disk that we receive this morning.

MS. BARNEY: For that limited purpose then?

MR. TEBBUTT: Yes.

MS. BARNEY: Okay.

MR. TEBBUTT: All right. Let's take a break.

(Short break taken.)

MR. TEBBUTT: On the record, any additional documents that we find that are produced today, we can ask questions about with follow-up questions.

(Exhibit No. 51 marked for identification.)

BY MR. TEBBUTT:

Q Mr. Tebb, you have in front of you Exhibit 51, an agenda draft for a meeting that you attended; correct?
1 A Yes.
2 Q And did you make a presentation on the Yakima River Basin at this meeting?
3 A Yes, I did.
4 Q Was it a PowerPoint presentation?
5 A I believe so.
6 Q Do you know if that PowerPoint presentation has been provided on the disk provided today?
7 A I do not know. I would be glad to provide it, though, if it is missing.
8 Q We would like to see that PowerPoint presentation. Did you have other notes that you would have made to help you present on that day?
9 A The notes and materials would primarily have been what the USGS provided in the context of the John Vaccaro report in its relationship to illustrating and demonstrating the hydrologic continuity of surface and groundwater.
10 Q Right. But my question is: Did you prepare separate notes to help you make a presentation?
11 A Typically, those would be part of just sort of the making of the presentation itself. There might be, but I don't -- I don't recall a specific set of notes for this particular presentation.
12 Q Could you search to see if you have notes --
Q -- from that presentation?
A Yeah, it's not my normal style. I kind of do it as I'm creating the presentation, but I can look.
Q So you normally would do the presentation, and just use that as the outline --
A Yeah, I would have my reference materials and I would just start building the presentation.
Q I understand. I do something very similar when I do them myself.
A Okay.
Q The USGS study that you are referring to, did it come out right around this time?
A Yes, it did.
Q And what were its conclusions, do you recall?
A Its conclusions were significant in that the Department of Ecology was required as part of a settlement to help fund and participate in the development and creation of this report, both by funding as well as participating in some of the technical reviews.
   The report basically concluded that groundwater and surface water are hydrologically connected, which means there is a relationship.
Q It's not a stunning scientific finding, is it, as a hydrogeologist yourself?
A It is not a stunning finding, but you would be surprised how information and methods of doing business were different without that information in the context of how we managed water quantity. We managed water quantity and issued permits in two separate buckets, groundwater and surface water. And this report basically said we shouldn't be doing that, that in fact the water in the Yakima basin is a single resource.

Q And so if, for instance, an entity like the dairy industry is polluting the groundwater, it will be hydrologically connected to the surface waters in that area; correct?

MS. KRISTENSEN: Objection, incomplete hypothetical, assumes facts not in evidence.

BY MR. TEBBUTT:

Q Isn't that a fair inference?

A I think that's a fair inference. It would be dependent upon space and time. There is a timing difference as it relates to groundwater when it expresses itself into a surface water body.

Q Right. But the general principle that the aquifer in the Lower Yakima County Valley, what is known as the Granger drain, that is it hydrologically connected to the Yakima River is a fairly certain scientific principle, is it not?
MS. KRISTENSEN: Same objection.

THE WITNESS: That is correct.

BY MR. TEBBUTT:

Q Certainly more likely than not as a scientist you could say that; correct?

MS. KRISTENSEN: Same objection.

THE WITNESS: In my professional opinion, that's correct.

BY MR. TEBBUTT:

Q And even as I said before, it's a far higher degree of certainty than more likely than not, would you agree?

MS. KRISTENSEN: Assumes facts not in evidence, beyond the scope of this deposition notice. He is not an expert in this case.

BY MR. TEBBUTT:

Q Go ahead.

A Reviewing, and in my experience as a licensed hydrogeologist and geologist, engineering geologist, and reviewing the USGS study report that was prepared by doctoral-level geologists from the United States Geological Survey, provides, I think, ample evidence and scientific evidence to make that conclusion.

Q So we talked about one of the bullet points was potential legal impacts. What were the potential legal impacts that you discussed?
This was more specifically two parts. One was the water quantity issue that I referred to earlier in regards to how water rights are permitted and issued and how they relate to the -- what we call the priority system. In other words, to achieve a water right, the moment that you achieve it, essentially when you file an application, you have what's called a priority date. And so what we basically had was, is we had a series of surface water rights that were issued priority dates. And in the Yakima Basin to be a senior water right you have to have a pre-May 10th, 1905 water right. The groundwater rights that we issued were subsequently after World War II, and therefore largely junior to that senior surface water right. So the relationship that I was speaking of in terms of the legal impacts is the fact that we have gone through a 30-year, 30-million-plus-dollar adjudication in the Yakima Basin, solely focused on the surface water rights. There is almost double the amount of information and process we have to go through to resolve groundwater rights in the context of an adjudication.

So what I was speaking of was my predecessors have created an out-of-priority use of groundwater in the Yakima Basin that's dependent upon a federal irrigation project that basically asks the state of Washington to
secure that water for its use as of May 10th, 1905. And so we had this issue here that -- I'm still dealing with it today.

Q Let me ask you, the dairies in the Lower Yakima Valley, use -- are you familiar with how much water they use?
A I'm familiar that they use a lot of water, I'm not familiar with how much exactly.

Q And that they have been given water rights?
A They have been given water rights.

Q But are they -- are those water uses regulated in any respect?
A They are regulated in the context of either the stock water permit -- stock water exemption, or they have an actual groundwater permit. So, in that instance, that's the form of regulation that they have. They are not -- if you mean during a time of drought that we would interrupt them, we have not resolved those issues yet. And that was what I was trying to illustrate, that we have, in my opinion, out-of-priority water use that is not being treated under the same regulatory regime that surface water rights are being treated under the Yakima Superior Court.

Q So the dairies are the out-of-priority water use that you are referring to? Because they have been subsequent to World War II?
MS. KRISTENSEN: Objection, lack of foundation.

THE WITNESS: In my opinion, they have a junior priority date to the May 10th, 1905 water right that was associated with the Yakima irrigation project.

BY MR. TEBBUTT:

Q Did you discuss any potential legal impacts of the hydrological connection that was found in the study to pollution discharges into the Yakima Basin?

A Yes. I think that was the context of the lower subject here, demonstrating that there was an observed high nitrate contamination in the shallow groundwater in the Yakima Basin, and therefore making a similar conclusion or analogy that this water then subsequently gets into surface water and that's a violation of our state water quality laws, as well as the Clean Water Act.

Q So those discharges to surface water from groundwater would add nutrients to the surface water; correct?

MS. KRISTENSEN: Objection, assumes facts not in evidence, incomplete hypothetical.

THE WITNESS: That was my conclusion.

BY MR. TEBBUTT:

Q And those additional nutrients will change water quality in the Yakima Basin; correct?

MS. KRISTENSEN: Same objection.
THE WITNESS: They will add to the degradation of the quality of the water quality.

BY MR. TEBBUTT:

Q What types of degradation?

A I think in the report some of the things are large E. coli, BOD issues, suspended sediments, chlorine, other kinds of contaminants that are associated with typical manure configuration.

Q So your concern with manure contamination of groundwater and its hydrological connection to surface water included E. coli?

A Potentially.

Q What about other pathogens?

A I would imagine the same for them.

Q Okay. Do you also have concerns about surface water runoff from manure applied to fields?

MS. KRISTENSEN: Same objection, lacks foundation, incomplete hypothetical.

THE WITNESS: I would.

BY MR. TEBBUTT:

Q So the same issues of nutrient contamination, nutrient and loading?

MS. KRISTENSEN: Same objection.

THE WITNESS: Yes.
BY MR. TEBBUTT:

Q And also exposure to pathogens?
A Yes.

Q So humans could be exposed to those pathogens in the surface water?

MS. KRISTENSEN: Objection, calls for speculation, incomplete hypothetical.

THE WITNESS: Yes. Actually, one of the beneficial uses that the water quality criteria provides is recreational use of a water body.

BY MR. TEBBUTT:

Q So if pathogens were affecting the surface waters, those would negatively impact those recreational values; correct?

MS. KRISTENSEN: Same objection.

THE WITNESS: That is my understanding.

BY MR. TEBBUTT:

Q And potentially put people at risk of health impairment?

MS. KRISTENSEN: Calls for speculation, objection.

THE WITNESS: Yes, that is correct.

MR. TEBBUTT: That's all I have. Thank you.

MS. KRISTENSEN: Mr. Tebb, I have a couple of follow-up questions for some of the things that you
were asked about earlier.

(Discussion held off the record.)

EXAMINATION

BY MS. KRISTENSEN:

Q Mr. Tebb, again I'm Deb Kristensen, I'm counsel for the dairy defendants in the four cases that you have been noticed here to appear for. And we have gone through a couple of different documents, and I will ask you to first turn to Exhibit 45.

I know Mr. Tebbutt asked you a bunch of questions about this, but the paper is titled "Issue Paper." Can you tell me what an issue paper is?

A Yes. An issue paper, or white paper depending upon the nomenclature, is typically a paper that would be produced by a professional hydrogeologist or geologist, in this instance, to provide a discussion on what options or approaches, based on science and based on the current standard of practice, would be used to essentially implement or improve our regulations.

Q Do you know why this specific issue paper, Exhibit 45, was written?

A I believe it had to do in the context of whether we would be requiring lined manure lagoons in the context of the CAFO permit.
Q I see the title on Exhibit 45 is a "Construction of Dairy Lagoons Below the Seasonal High Groundwater Table." Do you see that?

A Yes.

Q And then if you turn to page 4 of that same exhibit, under the paragraph that begins with "Options," and before we get to option 1 there, the last sentence says, "There are two main options for designing dairy lagoons in areas where there is a seasonally high groundwater table." Do you see that?

A I do.

Q Is this issue paper meant to address only those lagoons where there is a seasonally high groundwater table?

A That is my understanding.

Q Okay. Is there -- in your opinion, is there a seasonally high groundwater table in the Yakima Valley?

A There can be, based on irrigation-induced, artificially elevating the groundwater table.

Q Do you know where the Cow Palace area is located?

A I do.

Q Do you have an opinion as to whether or not there is a seasonally high groundwater table at the Cow Palace location?

A My professional assessment and judgment of that is that there is not.
Q Okay. Do you know where the Liberty Bosma area is?
A I believe it is further down in the basin; and I don't know exactly where it is.
Q Do you have an opinion as to whether or not there is a seasonally high groundwater table at the Liberty Dairy?
A Again, not knowing its exact location, but if it is in the lower portions below, say, the canals, either the Rosa or Sunnyside Canal, that's a potential.
Q I will represent to you that the Liberty Dairy is adjacent and close to the Cow Palace Dairy.
A Okay.
Q Do you know where the DeRuyter, the DNA dairy is located?
A I do not.
Q Do you know where the George DeRuyter dairy is located?
A I do not.
Q So do you have an opinion one way or another as to whether the recommendations in Exhibit 45 apply specifically to the lagoons in any of the four dairies at issue here?
A I do not have an opinion on that.
Q Mr. Tebbutt also asked you about Exhibit 47. And page 9 of that report, which has the Bates number CARE 26421 -- do you see that one -- yeah, 9 of 34.
Mr. Tebbutt asked you about the language there at
the top of that page, and that's under "Effluent Limitations" of S1 and subparagraph B, "Groundwater Effluent Limitations." The top of that sentence that we didn't go over, can you read that out loud?

A On top of page 9, the top sentence?

Q Yes.

A Yes. "The permittee must only apply manure, litter, and processed wastewater to lands as specified in its nutrient management plan."

Q Okay. So what is your understanding of what that language means? If a dairy applies its processed wastewater in accordance with this nutrient management plan, then it's in compliance with this provision?

A That is my --

MR. TEBBUTT: Objection, calls for a legal conclusion.

BY MS. KRISTENSEN:

Q Is that your understanding?

A That is my understanding.

Q In the paragraph below 1 and 2 there, Mr. Tebbutt, again, drew your attention to the first sentence there of that language. The second sentence there reads, "Contaminant concentrations of chemicals and nutrients found in saturated soils that have been applied at agronomic rates for agricultural purposes are exempt
from all requirements of," and then it lists chapter 173-200 WAC, and it goes on.

Do you understand what an "agronomic rate" is as that term is used in that provision?

A Yes, I have a basic understanding.

Q Can you describe?

A My understanding of that is that the materials or the contaminant concentrations of the manure, if you will, is applied to the soil in such a manner and in such a concentration that the crop would basically take that material up in its production --

Q Okay. And --

A -- as a form of fertilizer.

Q On the agronomic rates that are referred to here, are they reflected in the nutrient management plans?

A That is my understanding.

Q So if a dairy is applying its nutrients at agronomic rates consistent with the nutrient management plan, it is your understanding they are complying with this provision?

A That is correct.

MR. TEBBUTT: Objection, calls for a legal conclusion.

BY MS. KRISTENSEN:

Q Turn to Exhibit 50, if you could. This is the e-mail
that Mr. Tebbutt was asking you to get into your conversation about the EPA study that came out in 2012. During the course of your discussion with Mr. Tebbutt, you said words to the effect of -- and I don't want to put words in your mouth -- but something along the lines of that you believe groundwater contamination is occurring around the dairies in the Yakima Valley; is that fair? Is that --

A I think there is a high probability that contamination is potentially coming from those facilities, yes.

Q Do you have an opinion as to whether there are other potential sources of nitrate contamination?

A I do. Yes, I believe there are other sources of contamination such as irrigated crop land, orchards, septic systems, a variety of things.

Q Are there any efforts at the Department of Ecology to identify those potential other sources of nitrate contamination?

A Yes. Under the Groundwater Management Area, advisory board process, we have just embarked upon a process what we are calling a nutrient loading model to determine just that.

Q Okay. How far along is that process? Where is the process?

A Unfortunately, it is not as far along as we would like.
But we just authorized, as of, I believe, last week, funding to be spent on that issue.

Q Is there a lead person in charge of that effort or is it a group effort? Could you describe that --

A Yakima County is the contracting agency as a grant with us, so it would have to be a conversation with Yakima County to determine who is the lead on that.

Q Okay. Are there any kind of timelines or milestones set up for what the group is going to do to identify other sources of potential nitrate contamination?

A Yeah. I believe that would be part of the scope of work that will be developed for the funding that's just been released into this nitrogen-loading model.

Q It sounds like it's pretty early in that process; is that fair?

A Yes, ma'am.

Q Have you been directly involved with those efforts?

A I have not.

Q Who from Ecology has been?

A Charlie McKinney, our water quality section manager.

Q Where is he located?

A He is in Yakima, Washington. He is the actual board member; I'm his alternate.

Q But he works for Ecology?

A Yes, ma'am.
In any of the documents that have been produced today, to the extent there are any documents related to these efforts to identify other potential sources of nitrates, either through your work as an alternate or Mr. McKinney's work, are those documents included in the materials that were produced today or will be produced shortly; do you know?

I do not know. I don't think they were because of the nature of the request for the document production.

If you turn to Exhibit 51, I notice this is a draft agenda, and I realized it just came off the desk. Did this change in any meaningful way from the time it was drafted to the time it became final?

I do not believe so.

Who attended, ever -- do you recall who attended this meeting?

I don't. It looks to be at a fairly high level, though, because those are myself, as a regional director; Jeannie Summerhays is a regional director out of our Northwest Regional Office; and then Josh Baldi was the special assistant to the director on water quality issues.

Where is Mr. Baldi, is he here?

Mr. Baldi is currently employed by the Department of Ecology at the Northwest Regional Office, regional
Q: Okay. Are you aware that there are consent orders that each of the four dairies -- that are at issue today have been -- have entered into with the EPA?

A: I am aware --

MR. TEBBUTT: Objection to the extent it mischaracterizes what they are.

THE WITNESS: Yes. I'm aware of a form of consent or some legal document that requires the dairies to do certain things.

BY MS. KRISTENSEN:

Q: Have you ever reviewed any of those consent orders?

A: I have not.

Q: Prior to those being entered into between the dairies and EPA, did you have any discussions with EPA about the need or their efforts to enter into consent orders with the dairies?

A: I did not.

Q: Okay. Do you know if anyone at Ecology did?

A: That's entirely possible. The Environmental Protection Agency pretty much held that material and their subsequent regulatory action pretty tight.

Q: I know Mr. Tebbutt asked you previously about the 2012 EPA study that was conducted. Did you have an opportunity to actually review that and provide any
comments back to the EPA on that study?

A  I personally did not. I believe our staff does, either both at our regional office in Yakima, Charlie McKinney's staff, or possibly someone at headquarters I wouldn't be aware of.

Q  You think someone at Ecology may have provided comments --

A  I'm not specifically aware of that.

Q  Are you aware of any comments that were provided by Ecology back to EPA on their study?

A  As I said, I believe there were some comments. I'm not specifically aware of them, nor their nature.

Q  Okay.

MS. KRISTENSEN: That's all I have.

MR. TEBBUTT: Okay. I just have one follow-up.

EXAMINATION

BY MR. TEBBUTT:

Q  With regard to Exhibit 47, Mr. Tebb, Ms. Kristensen asked you some questions about the language on page 9. If you would turn to that, please.

Ms. Kristensen asked you questions about whether applications at agronomic rates -- if a facility was applying at agronomic rates, if they would then be in
1    compliance with the permit, and I believe you answered
2    yes; is that correct?
3    A    Yes.
4    Q    Doesn't the last clause of the last sentence of
5    paragraph B, which states, "If those contaminants will
6    not cause pollution of any ground waters below the root
7    zone," change your -- doesn't that language change your
8    opinion about whether compliance would be achieved?
9    A    Absolutely.
10   Q    So if the contaminants reach groundwater, then
11    compliance will not be achieved; correct?
12   A    That is correct.
13    MR. TEBBUTT: That's all I have. Thank
14    you. We will reserve the opportunity to -- on the
15    record ask further questions pending the provision of
16    additional documents.
17    (Proceedings adjourned at 11:00 a.m.)
18    (Signature reserved.)
CERTIFICATE

I, Laura Gjuka, a Certified Court Reporter in and for the State of Washington, residing at University Place, Washington, authorized to administer oaths and affirmations pursuant to RCW 5.28.010, do hereby certify;

That the foregoing Verbatim Report of Proceedings was taken stenographically before me and transcribed under my direction; that the transcript is a full, true and complete transcript of the proceedings, including all questions, objections, motions and exceptions;

That I am not a relative, employee, attorney or counsel of any party to this action or relative or employee of any such attorney or counsel, and that I am not financially interested in the said action or the outcome thereof;

That upon completion of signature, if required, the original transcript will be securely sealed and the same served upon the appropriate party.

IN WITNESS HEREOF, I have hereunto set my hand this _____ day of__________________, 2014.

Laura Gjuka, CCR No. 2057
1  DEPOSITION OF THOMAS TEBB
2  CORRECTION AND SIGNATURE CERTIFICATE
3
4  I, __________________________, hereby certify under
5  penalty of perjury of the laws of the state of
6  Washington that I have read my foregoing deposition
7  taken the _______ day of ________________, 2014, and
8  that to the best of my knowledge the deposition is true
9  and accurate with the exception of the following
10  corrections:
11
12  PAGE  LINE   CORRECTION
13
14
15
16
17
18
19
20
21
22  Executed at _________________________, Washington on
23  the ______ day of __________________, 2014.
24
25  __________________________
26  (Deponent’s Signature)
| basics   | 6:3       | bullet   | 10:21 66:23 |
| basin    | 63:3 65:8 67:10,17,24 69:9, 13,24 74:2 | bunch    | 72:11   |
| basis    | 21:7     | bureau   | 60:2    |
| bay      | 15:17    |          |         |
| began    | 17:10    |          |         |
| beginning | 12:15 31:2 |          |         |
| begins   | 44:9 73:6 |          |         |
| belief   | 52:19    |          |         |
| beneficial | 71:9   |          |         |
| Berkeley | 12:3     |          |         |
| biennial | 38:15    |          |         |
| Bill     | 60:15    |          |         |
| biological | 41:6  |          |         |
| bit      | 39:21 46:5 55:24 |          |         |
| board    | 61:4 77:20 78:22 |          |         |
| Bob      | 16:7,8 19:12,13 60:15 |          |         |
| BOD      | 70:6     |          |         |
| body     | 65:20 71:10 |          |         |
| Bosma    | 59:2,4 74:1 |          |         |
| bottom   | 17:12 23:16 44:13 |          |         |
| bottoms  | 41:21    |          |         |
| Bouchey  | 35:21    |          |         |
| break    | 8:2,3,4 40:12,16,18,23 61:11 62:16,17 |          |         |
| breaking | 40:10    |          |         |
| briefing | 56:19,25 |          |         |
| Brothers | 46:14 51:18,21 |          |         |
| brought | 10:1 17:21 |          |         |
| Bruce    | 37:2     |          |         |
| buckets  | 65:5     |          |         |
| budget   | 38:15    |          |         |
| build    | 19:3     |          |         |
| building | 15:17 64:8 |          |         |
| built    | 28:13,16,17 41:8,12,15 |          |         |
| C        |          |          |         |
| CAFO     | 33:15,24 37:16 43:4 54:3 72:25 |          |         |
| Cal      | 12:3     |          |         |
| California | 15:10 |          |         |
| called   | 38:1 67:7 |          |         |
| calling  | 77:21    |          |         |
| Canal    | 74:8     |          |         |
| canals   | 74:7     |          |         |
| career   | 12:17    |          |         |
| carrying | 48:25    |          |         |
| case     | 6:19 7:18 48:10 66:14 |          |         |
| cases    | 6:8,9,14 18:8 72:7 |          |         |
| categories | 8:16,17 10:7 |          |         |
| caused   | 53:7     |          |         |
| CCR#     | 5:3      |          |         |
| CD       | 8:18,23  |          |         |
| cell     | 5:25     |          |         |
| Center   | 6:25     |          |         |
| central  | 14:8,17 22:15 55:25 |          |         |
| certainty | 66:11  |          |         |
| certified | 5:4 13:6 |          |         |
| challenge | 34:10   |          |         |
| Chandler | 35:23 37:2 |          |         |
| Chandler's | 37:5   |          |         |
| change   | 69:23 79:12 82:7 |          |         |
| changed  | 57:20    |          |         |
| changing | 24:17    |          |         |
| chapter  | 30:12 76:1 |          |         |
| charge   | 78:3     |          |         |
| Charlie  | 6:23 40:10 48:9 78:20 81:4 |          |         |
| checked  | 15:2     |          |         |
| chemicals | 75:23  |          |         |
| chlorine | 70:6     |          |         |
| chose    | 53:6     |          |         |
| circulating | 54:3 |          |         |
| circumstances | 44:22,23 45:18 |          |         |
| citizen  | 34:1     |          |         |
| citizens | 18:9     |          |         |
| citizens* | 19:24   |          |         |
| civil    | 12:12    |          |         |
| claims   | 7:1      |          |         |
| classes  | 12:11    |          |         |
| clause   | 82:4     |          |         |
| Clean    | 35:3 59:14 69:16 |          |         |
| cleaned  | 25:5     |          |         |
| Cleanwater | 5:2    |          |         |
| client   | 59:14    |          |         |
| clients  | 15:15    |          |         |
| close    | 61:12 74:10 |          |         |
| code     | 5:25     |          |         |
| coli     | 26:5 31:8 70:6,11 |          |         |
| collected | 8:23 26:7 57:2 |          |         |
| college  | 15:23 18:24 19:5 |          |         |
| column   | 46:4 47:3 49:6,11,17,25 |          |         |
| comment  | 32:12    |          |         |
| comments | 81:1,7,9,11 |          |         |
| commissioned | 18:7   |          |         |
| commissioners | 35:20 |          |         |
communicate 39:12
company 15:9
comparing 26:19
complaints 34:1
complete 12:6,9
compliance 47:4 75:13 82:1,8,11
complying 76:19
component 54:24,25
comprehensive 21:16
concentrated 26:7,14 42:21
concentration 25:19,22,25 26:9 76:10
concentrations 75:23 76:8
concern 45:9 52:5 70:9
concerned 31:9 32:14 49:10 50:16,21
concerns 29:23 43:19 70:15
conclude 61:21
concluded 61:18 64:21
conclusion 66:22 69:13,21 75:16 76:23
conclusions 56:24 57:8,10,13 64:15,16
conducted 80:24
conducting 56:23
conference 60:4
configuration 33:24 70:8
confusing 7:14
connected 64:22 65:11,23
connection 69:8 70:10
consent 80:2,9,12,16
Conservation 7:1
consideration 45:1,12
consistent 76:18
constitutes 47:8
Construct 27:6
constructed 23:25 41:13,15 42:18
construction 22:8 23:9 29:24 30:22 73:1
Consultants 15:9,12
contact 38:3
contained 23:21
containment 27:8
contaminant 25:18, 37:25 75:23 76:8
contaminants 17:10 26:9,11 70:7 82:5,10
contaminated 24:7,12 32:14
contamination 7:3 16:18 18:1,1 20:25 21:11,19 46:22 57:15 69:12 70:9,21 77:6,9,12,14,18 78:10
continue 33:16 34:3 62:2
continues 10:25 44:15
continuing 8:8 39:11
continuity 63:17
contract 38:18,19 40:5
contracting 38:17 78:5
contrast 46:19
contribute 45:19
conversation 37:1 77:2 78:6
conversations 31:11 35:19,22 58:2,15 60:1
conveying 56:16
coordination 34:5
copied 31:18
copies 61:11
copy 56:11
correctly 24:17
correlation 50:13
.correspondence 9:15
counsel 7:17 8:19 10:10 72:6
counts 26:5
County 35:15,17,19,20,25 36:4,12 38:3,18 39:6 40:2,5 52:8 65:22 78:5,7
County's 39:24
couple 71:24 72:9
court 5:4,12 17:3 52:23,25 68:22
Cow 60:17,18 73:19,22 74:10
cows 25:21
created 67:23
creates 27:9
creating 64:4
creation 64:18
criteria 38:22 45:16 71:9
crop 48:17 76:10 77:14
crops 48:5
cultivated 50:12,15 51:2
current 17:23 33:24 72:19
cycle 47:24 55:6

daily 45:10
Thomas Tebb 02/26/2014

Jeannie 79:19
Jeannie's 80:1
Jennings 11:6 56:16
job 14:1 21:4
John 63:15
Johnson 9:9 10:18
Join 27:2
Jon 11:6
Josh 79:20
judgment 73:24
junior 67:13 69:4

K

Kennewick 14:25
Kevin 35:21
kick 52:9
kicking 52:11
Kimsey 22:9,11,12
Kimsey's 43:25
kind 15:13,18 24:13,15 36:5,8 37:24 41:19 64:3 78:8
kinds 70:7
knowing 74:6
knowledge 29:6 41:18

Kristensen 7:17 16:20 23:23
25:10 26:2,12,25 27:11 30:7
32:22 34:18 36:13 41:10,25 42:8
43:22 45:21 47:18 48:8,19 49:3,
66:1,6,12 69:1,19,25 70:17,23
71:6,15,19,24 72:5,6 75:17 76:24
80:11 81:14,20,23

L

Lacey 22:16
lack 36:13 55:15 57:24 69:1
lacks 70:17
lagoon 23:21 26:18,22,23,24
27:6,7,10 30:17 40:24 41:8,9,12,
15 42:18 45:10
lagoons 22:8 23:24 24:1 28:3,13,
16,19,29:25 30:2,5,9,12,23 41:21
43:20 72:24 73:2,8,12 74:19
land 77:14
lands 75:8
language 74:25 75:11,22 81:21
82:7
large 24:24 70:5
largely 67:13
LAURA 5:3
laws 69:16
lawsuit 59:15
lead 78:3,7
leading 36:25 49:13
leak 27:7 41:13,24 42:5
leakage 44:5
leaking 43:20
leaving 61:23
left 16:10 62:7
legal 66:24 67:15 69:7 75:15
76:22 80:9
legislature 34:21
letter 46:14 51:17
level 34:8 37:19,20 38:1 54:19,20
58:2 59:25 79:17
levels 15:2 31:7 33:21 35:7,9
49:11
LHG 13:1
Liberty 74:1,5,9
license 13:5,17
licensed 13:2,12,19 41:2 66:17
licenses 13:5,15
licensing 13:16
Lieta 35:20
light 15:5
Limitations 44:11,13 75:2,3
limited 38:11 61:23 62:6,11
Linden 16:1,2
lined 27:7 72:24
liner 41:19
liners 41:24 42:6,7
lines 77:5
liquid 23:20 26:18
list 38:22
listed 33:1 54:12
lists 44:22 76:1
litter 75:7
loaded 46:16
loading 26:6 46:25 47:1 49:17,24
70:22 77:21
local 59:9
locally 60:2
located 73:19 74:13,15 78:21
location 73:23 74:6
locations 57:16
locked 50:10
long 13:11 27:20
longer 16:2,8
looked 9:21
Lori 51:22
loud 75:4
lower 16:14,18 17:16 18:1,25
21:1, 33:12 52:8 65:22 68:4 69:10
74:7

M

made 11:9 32:12,20 33:11 37:21
55:1 57:8 61:11 63:12
maiden 22:13
mail-out 39:6
main 73:8
make 15:5 32:21 50:13 63:2,20
reserved 82:18
residing 5:4
resolve 37:10 67:20
resolved 68:17
resource 54:15 65:8
resources 14:7,18
respect 9:22 68:11
respective 33:18 34:6
respond 11:16
responding 34:1
response 43:19 52:22 53:1,2 61:25
responsibility 34:11 55:10
responsive 10:20
restate 29:11 51:15,16
Restoration 6:24
result 9:1 18:7 32:15
resulted 17:13
results 38:5 57:10,12
retention 23:10
reviewers 23:7
reviewing 16:12 19:9 43:8 66:17,19
reviews 64:20
rights 67:3,9,12,18,20 68:8,9,21
risk 71:18
River 63:2 65:24
road 52:9,11
robust 56:25
Roger 9:9
role 6:11 33:6 34:15 36:25
roles/responsibilities 33:18
Rosa 74:8
round 39:5,16,18
rounds 39:4
rules 6:23 7:5
runoff 70:16
rush 17:4
S
S1 44:11 75:2
S1(b) 44:12
Safety 6:25
sample 49:20
samples 49:16
sampling 17:16 57:9
San 15:10,17
satisfaction 37:12
satisfactory 19:19
satisfied 19:17
saturated 75:24
saturation 47:14
scale 24:24
scenario 51:1
School 11:22 12:5,20
science 12:2 72:18
scientist 41:1,3,7 66:4
scope 47:19 48:9 66:13 78:11
scribble 20:15,16
search 63:25
searches 11:4
seasonally 73:9,13,16,22 74:5
sec 12:6
section 6:18 14:7,16,21 27:23 44:8,10,11,14,19 59:16 78:20
secure 68:1
sediments 70:6
seepage 44:20
seeping 41:20
Senator 36:22 37:3,4 38:13
senior 67:10,14
sense 25:14 26:18 34:8 52:6
sentences 73:7 75:3,5,21,22 82:4
sentences 27:16
separate 20:6 63:19 65:5
September 16:13
septic 77:15
series 32:20 46:3,6 67:8
served 45:2
set 63:23 78:8
settlement 64:17
settlements 18:8 19:24
sewage 24:20,25 25:18 26:1,20
Shakes 7:8
shallow 69:12
share 52:5
sharp 18:20
shoreland 59:17
shorelands 14:21 59:16
short 40:18 61:10 62:17
shortly 59:12 79:7
sic 8:19
side 34:12
signature 82:18
significant 64:16
similar 18:24 64:9 69:13
similarly 39:19
simply 51:22
single 65:8

Index: reserved..sir
Central Court Reporting 800.442.3376
tests 38:6 49:19
things 7:8,24 9:20 11:12 59:10 60:4 70:5 71:25 77:15 80:10
Thomas 5:11,18
thousand 38:25
tight 80:22
timelines 78:8
times 6:6,7
timing 65:18
title 73:1	
titled 72:12	
today 8:17 10:19 32:18 37:24 61:12,21 62:20 63:8 68:3 79:1,6 80:3
told 18:16
top 32:12 44:9 50:23,24 75:1,3,5
topics 57:1 59:9
Toppenish 11:22
tough 53:3
trainings 12:18
transferred 11:24
transforms 48:4
tavel 8:24
treated 24:8,12 68:20,21
treatment 24:18,20,23
trial 6:20 7:22
Tumwater 5:2
turn 72:10 73:5 76:25 79:10 81:22
type 6:8 12:11 18:24 23:8 25:18
types 23:11 30:2 70:4
typical 70:8
Fertility Report

George DeRuyter & Sons (Y281)

**Field:** GDS-SU-01  
**Acres:** 17.8  
**Sample Date:** 10/9/2013

**Crop:** Alfalfa  
**Irrigation:** Wheel line

**Previous Crop:** 2013 Alfalfa  
**Current Crop:** 2014 Alfalfa

**Soil series:** Scoon silt loam  
**Leach Hazard:** Low

**Topography:** Gentle SW slope.  
**Avg Sampling Depth:** 1.8

**Restrictive layer?** Y  
**Where?** Caliche and rocks in scattered sites. The west part of the field is the deepest.

**Residue Incorp?** N

**Type?**

**Comments:** Sampled a three foot field composite. At the time of sampling, the alfalfa had been cut and was still on the ground. Alfalfa at 2" tall and a 50% canopy.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>NO₃</th>
<th>NO₂</th>
<th>NH₄</th>
<th>SO₄</th>
<th>B</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>Na</th>
<th>T.B.</th>
<th>CEC</th>
<th>VolWt</th>
<th>%AW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>12</td>
<td>42</td>
<td>12</td>
<td>44</td>
<td>1.1</td>
<td>17.8</td>
<td>3.8</td>
<td>0.66</td>
<td>0.24</td>
<td>22.50</td>
<td>15.9</td>
<td>1.25</td>
<td>1.25</td>
</tr>
<tr>
<td>Field Composite</td>
<td>2'</td>
<td>7</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Composite</td>
<td>3'</td>
<td>5</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td>82</td>
<td>12</td>
<td>44</td>
<td>1.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:** Residual nitrates are low overall. Ammonium is at equilibrium. Sulfur is adequate, while boron is low. Sodium is favorably low.

**Fertility and chemical data used here to formulate a recommendation was processed and reported by Soil Test, Inc., and Agrimanagement, Inc. soil lab for deep profile nitrates.**
Fertility Report

George DeRuyter & Sons (Y281)

Field: GDS-SU-02
 Acres: 99.1
Crop: Triticale-Sudan
Irrigation: Wheel line

Soil series: Scoon silt loam
Leach Hazard: Low
No. of Sites: 30

Topography: Gently undulating
Avg Sampling Depth: 3.0

Restrictive layer? Y
Where? Gravel on the surface, caliche layer.

Residue Incorp? N
Type? Alfalfa cultivated, Triticale-Sudan planted.

Comments: Sampled a three foot field composite. At sampling the Triticale was at 2-4" tall. Volunteer alfalfa, corn, and weeds. Whitish soil color on the knolls and ridges.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>NO₃</th>
<th>NO₃</th>
<th>NH₄</th>
<th>SO₄</th>
<th>B</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>Na</th>
<th>T.B.</th>
<th>CEC</th>
<th>VolWt</th>
<th>%AW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>19</td>
<td>65</td>
<td>7</td>
<td>37</td>
<td>1.6</td>
<td>16.20</td>
<td>3.90</td>
<td>1.04</td>
<td>0.30</td>
<td>21.44</td>
<td>19.2</td>
<td>1.25</td>
<td>75%</td>
</tr>
<tr>
<td>Field Composite</td>
<td>2'</td>
<td>24</td>
<td>81</td>
<td>7</td>
<td>37</td>
<td>1.6</td>
<td>16.20</td>
<td>3.90</td>
<td>1.04</td>
<td>0.30</td>
<td>21.44</td>
<td>19.2</td>
<td>1.25</td>
<td>88%</td>
</tr>
<tr>
<td>Field Composite</td>
<td>3'</td>
<td>14</td>
<td>49</td>
<td>7</td>
<td>37</td>
<td>1.6</td>
<td>16.20</td>
<td>3.90</td>
<td>1.04</td>
<td>0.30</td>
<td>21.44</td>
<td>19.2</td>
<td>1.25</td>
<td>81%</td>
</tr>
</tbody>
</table>

Totals: 195 7 37 1.6

Comments: The residual nitrates are moderate. Ammonium is in equilibrium. Sulfur is adequate, while boron is possibly marginal. Sodium is favorably lower.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>P(2%)</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
<th>Fe</th>
<th>Cu</th>
<th>O.M.</th>
<th>pH</th>
<th>EC mmhos/cm</th>
<th>Eff/Calc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>126</td>
<td>405</td>
<td>12.0</td>
<td>1.3</td>
<td>22</td>
<td>1.7</td>
<td>3.5%</td>
<td>7.3</td>
<td>0.35</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Comments: The soil P, K, and Zn are sufficient. Mn is low, while Fe and Cu are sufficient. Organic matter is high. Soil pH is near neutral, while salts are low.

Fertility and chemical data used here to formulate a recommendation was processed and reported by Soil Test, Inc., and Agrimanagement, Inc. soil lab for deep profile nitrates.
# Fertility Report

**George DeRuyter & Sons (Y281)**

**Field:** GDS-SU-03  
**Acres:** 28.4  
**Sample Date:** 10/15/2013  
**Crop:** Alfalfa  
**Irrigation:** Wheel line  
**Previous Crop:** 2013 Alfalfa  
**Current Crop:** 2014 Alfalfa

**Soil series:** Scoon silt loam  
**Leach Hazard:** Low  
**No. of Sites:** 25  
**Topography:** Flat  
**Avg Sampling Depth:** 3.0

**Restrictive layer?** Y  
**Where?** Very rocky, gravelly at the surface.  
**Residue Incorp?** N  
**Type?** Alfalfa at 2-4".

**Comments:** Sampled a three foot field composite. Soil surface dry. The NE 1/3 is more rocky than the rest of the field. Very few weeds.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>NO₃</th>
<th>NO₂</th>
<th>NH₄</th>
<th>SO₄</th>
<th>B</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>Na</th>
<th>T.B.</th>
<th>CEC</th>
<th>VolWt</th>
<th>%AW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>9</td>
<td>29</td>
<td>9</td>
<td>54</td>
<td>1.6</td>
<td>13.30</td>
<td>3.30</td>
<td>0.49</td>
<td>0.16</td>
<td>17.25</td>
<td>1.25</td>
<td>74%</td>
<td></td>
</tr>
<tr>
<td>Field Composite</td>
<td>2'</td>
<td>4</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.25</td>
<td>84%</td>
<td></td>
</tr>
<tr>
<td>Field Composite</td>
<td>3'</td>
<td>3</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.25</td>
<td>77%</td>
<td></td>
</tr>
</tbody>
</table>

**Totals:** 52 9 54 1.6

**Comments:** The residual nitrates are low. Ammonium is in equilibrium. Sulfur is sufficient, while boron is marginal. Sodium is favorably low.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>P(%)</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
<th>Fe</th>
<th>Cu</th>
<th>O.M.</th>
<th>pH</th>
<th>EC mmhos/cm</th>
<th>Eff/Calc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>118</td>
<td>100</td>
<td>11.9</td>
<td>1.6</td>
<td>37</td>
<td>2.1</td>
<td>2.7%</td>
<td>7.3</td>
<td>0.28</td>
<td>Very Slight</td>
</tr>
</tbody>
</table>

**Comments:** The soil P is high, while K is marginal. Zinc is high, while Mn is low. Fe and Cu are sufficient. Organic matter is well above average. Soil pH is near neutral and salts are favorably low.

Fertility and chemical data used here to formulate a recommendation was processed and reported by Soil Test, Inc., and Agrimanagement, Inc. soil lab for deep profile nitrates.
Fertility Report

George DeRuyter & Sons (Y281)

Field: GDS-SU-04  Acres: 135.6  Sample Date: 10/14/2013
Crop: Triticale-Silage Corn  Irrigation: Center pivot
Previous Crop: 2013 Triticale-Silage corn
Current Crop: 2014 Triticale-Silage corn

Soil series: Warden silt loam  Leach Hazard: Low  No. of Sites: 30
Topography: Gently divided sloping  Avg Sampling Depth: 3.0
Restrictive layer? Y  Where? Some rocks, mainly in the NW corner.
Residue Incorp? N  Type? Scattered cultivation strips.
Comments: Sampled a three foot field composite. Light weed cover. Corn stalk size was normal. Soil surface was dry.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>NO₃</th>
<th>NO₃</th>
<th>NH₄</th>
<th>SO₄</th>
<th>B</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>Na</th>
<th>T.B.</th>
<th>CEC</th>
<th>Vol/Wt</th>
<th>%AW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>184</td>
<td>624</td>
<td>7</td>
<td>925</td>
<td>10.8</td>
<td>17.1</td>
<td>4.8</td>
<td>6.79</td>
<td>1.27</td>
<td>29.96</td>
<td>16.0</td>
<td>1.25</td>
<td>90%</td>
</tr>
<tr>
<td>Field Composite</td>
<td>2'</td>
<td>166</td>
<td>564</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Composite</td>
<td>3'</td>
<td>173</td>
<td>587</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals:</td>
<td></td>
<td>1774</td>
<td>7</td>
<td>925</td>
<td>10.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments: The residual nitrates are excessive. Ammonium is in equilibrium. Sulfur and boron are very high. Sodium is slightly to moderately elevated.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>P(%)</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
<th>Fe</th>
<th>Cu</th>
<th>O.M.</th>
<th>pH</th>
<th>EC mmhos/cm</th>
<th>Eff/Calc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>396</td>
<td>2650</td>
<td>13.5</td>
<td>2.9</td>
<td>31</td>
<td>2.8</td>
<td>3.3%</td>
<td>7.8</td>
<td>2.34</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Comments: The soil P and K are very high, and Zn is high. Mn is low, while Iron and Copper are adequate. Organic matter is high. The soil pH remains alkaline and salts are high.

Fertility and chemical data used here to formulate a recommendation was processed and reported by Soil Test, Inc., and Agrimanagement, Inc. soil lab for deep profile nitrates.
**Fertility Report**

George DeRuyter & Sons (Y281)

- **Field:** GDS-SU-05
- **Acres:** 100.6
- **Crop:** Triticale-Silage Corn
- **Irrigation:** Center pivot
- **Sample Date:** 10/9/2013
- **Previous Crop:** 2013 Triticale-Silage Corn
- **Current Crop:** 2014 Triticale-Silage Corn

**Soil series:** Warden silt loam  
**Leach Hazard:** Low  
**No. of Sites:** 30  
**Avg Sampling Depth:** 2.4

**Restrictive layer?** Y  
**Where?** Rocks throughout at scattered sites.

**Residue Incorp?** N  
**Type?** Light stalks, partly disked in early fall.

**Comments:** Sampled a three foot field composite. There had been moderate to heavy weeds in this field.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>NO₃</th>
<th>NO₂</th>
<th>NH₄</th>
<th>SO₄</th>
<th>B</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>Na</th>
<th>T.B.</th>
<th>CEC</th>
<th>VolWt</th>
<th>%AW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite 1'</td>
<td>263</td>
<td>894</td>
<td>4</td>
<td>972</td>
<td>12.3</td>
<td>17.10</td>
<td>5.10</td>
<td>7.62</td>
<td>1.45</td>
<td>31.27</td>
<td>17.4</td>
<td>1.25</td>
<td>74%</td>
<td></td>
</tr>
<tr>
<td>Field Composite 2'</td>
<td>254</td>
<td>864</td>
<td>1.25</td>
<td>72%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Composite 3'</td>
<td>263</td>
<td>894</td>
<td>1.25</td>
<td>81%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals:</td>
<td>2652</td>
<td>4</td>
<td>972</td>
<td>12.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:** Residual nitrates are excessive. Ammonium is in equilibrium. Sulfur and boron are very high. Sodium is moderately elevated.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>P&lt;sub&gt;(ppm)&lt;/sub&gt;</th>
<th>K</th>
<th>Mn</th>
<th>Fe</th>
<th>Cu</th>
<th>O.M.</th>
<th>pH</th>
<th>EC mmhos/cm</th>
<th>Eff/Calc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite 1'</td>
<td>529</td>
<td>2970</td>
<td>12.8</td>
<td>2.1</td>
<td>17.1</td>
<td>2.6</td>
<td>1.6%</td>
<td>7.7</td>
<td>3.56</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Comments:** Soil P, K, and Zn are excessive. Manganese is low, while Iron and Copper are adequate. Soil pH is alkaline, while salts are very high.

Fertility and chemical data used here to formulate a recommendation was processed and reported by Soil Test, Inc., and Agrimanagement, Inc. soil lab for deep profile nitrates.
**Fertility Report**

George DeRuyter & Sons (Y281)

**Field:** GDS-SU-06  **Acres:** 84.5  **Sample Date:** 10/16/2013

**Crop:** Triticale-Silage Corn  **Irrigation:** Center pivot

**Previous Crop:** 2013 Triticale-Silage corn  **Current Crop:** 2014 Triticale-Silage corn

**Soil series:** Warden silt loam  **Leach Hazard:** Low

**Topography:** Gently undulating  **Avg Sampling Depth:** 2.7

**Restrictive layer?** Y  **Where?** Scattered moderately compacted zones, and rocks at 18-36".

**Residue Incorp?** N  **Type?** Light to moderate stalks and weeds.

**Comments:** Sampled a three foot field composite. Post harvest. Soil surface dry. Scattered light to moderate weeds. Scattered areas with light salts visible on the surface.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>NO₃</th>
<th>NO₂</th>
<th>NH₄</th>
<th>SO₄</th>
<th>B</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>Na</th>
<th>T.B.</th>
<th>CEC</th>
<th>VolWt</th>
<th>%AW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>47</td>
<td>161</td>
<td>5</td>
<td>384</td>
<td>6.2</td>
<td>17.00</td>
<td>4.30</td>
<td>3.38</td>
<td>0.70</td>
<td>25.38</td>
<td>17.4</td>
<td>1.25</td>
<td>65%</td>
</tr>
<tr>
<td>Field Composite</td>
<td>2'</td>
<td>82</td>
<td>277</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Composite</td>
<td>3'</td>
<td>102</td>
<td>348</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td></td>
<td>786</td>
<td>5</td>
<td>384</td>
<td>6.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:** Residual nitrates are high. Ammonium is in equilibrium. Sulfur and boron are high. Sodium is slightly elevated.

**Immobile Nutrients (ppm)**

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>P (P≤0.04)</th>
<th>K</th>
<th>Mn</th>
<th>Fe</th>
<th>Cu</th>
<th>O.M.</th>
<th>pH</th>
<th>EC mmhos/cm</th>
<th>Eff/Calc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>162</td>
<td>1320</td>
<td>10.1</td>
<td>1.8</td>
<td>17</td>
<td>2.0</td>
<td>2.5%</td>
<td>7.9</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Comments:** Soil P, K, and Zn are high. Mn is low, while Fe is marginal, and Cu is sufficient. Organic matter is above average. Soil pH is quite alkaline, while salts are only slightly elevated.

Fertility and chemical data used here to formulate a recommendation was processed and reported by Soil Test, Inc., and Agrimanagement, Inc. soil lab for deep profile nitrates.
Fertility Report

George DeRuyter & Sons (Y281)

Field: GDS-SU-07
Crop: Alfalfa
Acres: 76.6
Irrigation: Center pivot

Sample Date: 10/9/2013
Previous Crop: 2013 Alfalfa
Current Crop: 2014 Alfalfa

Soil series: Warden silt loam
Leach Hazard: Low
No. of Sites: 30
Avg Sampling Depth: 2.6

Residue Incorp? N Type?

Comments: Sampled a three foot field composite. Harvested recently. Alfalfa at 2-3" tall with a 50% canopy overall.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>NO(_3)</th>
<th>NO(_3)</th>
<th>NH(_4)</th>
<th>SO(_4)</th>
<th>B</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>Na</th>
<th>T.B.</th>
<th>CEC</th>
<th>Vol/Wt</th>
<th>%AW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>31</td>
<td>104</td>
<td>5</td>
<td>286</td>
<td>5.1</td>
<td>19.90</td>
<td>4.00</td>
<td>1.94</td>
<td>0.72</td>
<td>26.56</td>
<td>16.1</td>
<td>1.25</td>
<td>78%</td>
</tr>
<tr>
<td>Field Composite</td>
<td>2'</td>
<td>74</td>
<td>252</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Composite</td>
<td>3'</td>
<td>76</td>
<td>257</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.25</td>
<td>1.25</td>
<td>74%</td>
</tr>
<tr>
<td>Totals:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>31.25</td>
<td></td>
</tr>
</tbody>
</table>

Comments: Residual nitrates are high. Ammonium is in equilibrium. Sulfur and boron are also high. Sodium is only slightly elevated.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>P(^{\text{Read}})</th>
<th>K</th>
<th>Mn</th>
<th>Fe</th>
<th>Cu</th>
<th>O.M.</th>
<th>pH</th>
<th>EC mmhos/cm</th>
<th>Eff/Calc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>90</td>
<td>757</td>
<td>9.1</td>
<td>1.5</td>
<td>17</td>
<td>2.0</td>
<td>1.9%</td>
<td>7.6</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Comments: Soil P, K, and Zn are high. Mn is low while Fe and Cu are sufficient. Organic matter is above average. Soil pH is moderately alkaline, while salts are okay.

Fertility and chemical data used here to formulate a recommendation was processed and reported by Soil Test, Inc., and Agrimanagement, Inc. soil lab for deep profile nitrates.
Fertility Report

George DeRuyter & Sons (Y281)

Field: GDS-SU-08  
Acres: 165.5  
Crop: Triticale-Silage Corn  
Irrigation: Center pivot

Soil series: Warden silt loam  
Leach Hazard: Low  
Topography: Gentle undulation, south slope.  
Restrictive layer? N  Where? Hard pan starting at about 24".  
Residue Incorp? N  Type? Corn stalks still standing.

Comments: Sampled a three foot field composite. Corn stalks were a fair to average in size, weak and strong stalks were mixed throughout the field. Some smut bodies on the remaining stalks. Salts on the soil surface.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>NO₃</th>
<th>NO₂</th>
<th>NH₄</th>
<th>SO₄</th>
<th>B</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>Na</th>
<th>T.B.</th>
<th>CEC</th>
<th>VolWt</th>
<th>%AW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>161</td>
<td>549</td>
<td>4</td>
<td>755</td>
<td>9.2</td>
<td>17.10</td>
<td>5.00</td>
<td>7.63</td>
<td>1.27</td>
<td>31.00</td>
<td>17.6</td>
<td>1.25</td>
<td>77%</td>
</tr>
<tr>
<td>Field Composite</td>
<td>2'</td>
<td>161</td>
<td>546</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Composite</td>
<td>3'</td>
<td>139</td>
<td>472</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.25</td>
<td>74%</td>
</tr>
</tbody>
</table>

Totals: 1567 4 755 9.2

Comments: The residual nitrates are high. Ammonium is in equilibrium. Sulfur and Boron are high. Sodium is moderately elevated.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>P (ppm)</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
<th>Fe</th>
<th>Cu</th>
<th>O.M.</th>
<th>pH</th>
<th>EC mmhos/cm</th>
<th>Eff/Calc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>243</td>
<td>2976</td>
<td>13.7</td>
<td>2.2</td>
<td>25</td>
<td>4.0</td>
<td>3.4%</td>
<td>7.7</td>
<td>1.63</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Comments: The soil P, K, and Zn are very high. Mn is low, while Fe and Cu are sufficient. Organic matter is high. Soil pH is alkaline and salts are moderately elevated.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>Cl</th>
<th>HCO₃</th>
<th>Lime Req</th>
<th>SMP</th>
<th>pH</th>
<th>EC mmhos/cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fertility and chemical data used here to formulate a recommendation was processed and reported by Soil Test, Inc., and Agrimanagement, Inc. soil lab for deep profile nitrates.
Fertility Report

George DeRuyter & Sons (Y281)

Field: GDS-SU-09  Acres: 34.6  Sample Date: 10/14/2013
Crop: Triticale-Silage Corn  Irrigation: Center Pivot  Previous Crop: 2013 Alfalfa

Soil series: Warden silt loam  Leach Hazard: Low  No. of Sites: 30  Current Crop: 2014 Triticale-Silage Corn

Topography: Split by swale, gently undulating  Avg Sampling Depth: 2.9
Restrictive layer? Y  Where? Some rocks and hard pan.
Residue Incorp? N  Type? Light to moderate crowns.

Comments: Sampled a three foot field composite. The average sampling depth was at 34". At the time of sampling the alfalfa was at 1-3" tall. The soil surface was dry. Weeds were minimal, some dandelion. The soil was very compacted. Water in the swale with grassy vegetation.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>NO₃</th>
<th>NO₃</th>
<th>NH₄</th>
<th>SO₄</th>
<th>B</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>Na</th>
<th>T.B.</th>
<th>CEC</th>
<th>Vol/Wt</th>
<th>%AW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>25</td>
<td>84</td>
<td>3</td>
<td>160</td>
<td>4.3</td>
<td>19.40</td>
<td>4.00</td>
<td>2.05</td>
<td>0.61</td>
<td>26.08</td>
<td>14.5</td>
<td>1.25</td>
<td>70%</td>
</tr>
<tr>
<td>Field Composite</td>
<td>2'</td>
<td>28</td>
<td>96</td>
<td></td>
<td></td>
<td></td>
<td>1.25</td>
<td>40%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Composite</td>
<td>3'</td>
<td>27</td>
<td>92</td>
<td></td>
<td></td>
<td></td>
<td>1.25</td>
<td>50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Totals: 272 3 160 4.3

Comments: Residual nitrates are moderate to high. Ammonium is at equilibrium. Sulfur and boron are plenty high. Sodium is only slightly elevated.

Immobil Nutrients (ppm)

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>P (am)</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
<th>Fe</th>
<th>Cu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>150</td>
<td>800</td>
<td>8.5</td>
<td>2.5</td>
<td>26</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Comments: The soil P, K, and Zn are plenty high. Mn is low, while Fe and Cu are adequate. Organic matter is above average. The soil pH is moderately alkaline, while salts are slightly elevated.

Fertility and chemical data used here to formulate a recommendation was processed and reported by Soil Test, Inc., and Agrimanagement, Inc. soil lab for deep profile nitrates.
## Fertility Report

George DeRuyter & Sons (Y281)

**Field:** GDS-SU-10  
**Acres:** 38.5  
**Crop:** Alfalfa  
**Irrigation:** Center pivot  
**Sample Date:** 10/15/2013  
**Previous Crop:** 2013 Triticale-Silage corn  
**Current Crop:** 2014 Alfalfa

**Soil series:** Warden silt loam  
**Leach Hazard:** Low  
**No. of Sites:** 25  
**Topography:** Gently undulating  
**Avg Sampling Depth:** 3.0

**Restrictive layer?** Y  
**Where?** Scattered compacted zones at 26-36", caliche in areas.  
**Residue Incorp?** N  
**Type?** Light to moderate residue.

**Comments:** Sampled a three foot field composite. Post harvest. Very light scattered salts on the surface. Light to moderate weeds. Generally good stalk diameter.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>NO₃</th>
<th>NO₃</th>
<th>NH₄</th>
<th>SO₄</th>
<th>B</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>Na</th>
<th>T.B.</th>
<th>CEC</th>
<th>VolWt</th>
<th>%AW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>49</td>
<td>167</td>
<td>2</td>
<td>153</td>
<td>2.2</td>
<td>19.80</td>
<td>3.0</td>
<td>1.85</td>
<td>0.69</td>
<td>25.34</td>
<td>1.25</td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td>Field Composite</td>
<td>2'</td>
<td>38</td>
<td>128</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Composite</td>
<td>3'</td>
<td>22</td>
<td>74</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:** The residual nitrates are high. Ammonium is in equilibrium. Sulfur is plenty high, and boron is sufficient. Sodium is slightly elevated.

### Immobile Nutrients (ppm)

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>P(ImMO)</th>
<th>K</th>
<th>Mn</th>
<th>Fe</th>
<th>Cu</th>
<th>O.M.</th>
<th>pH</th>
<th>EC mhos/cm</th>
<th>Eff/Calc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>53</td>
<td>723</td>
<td>4.0</td>
<td>1.2</td>
<td>11</td>
<td>1.1</td>
<td>2.2%</td>
<td>7.8</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Comments:** The soil P, K, and Zn are plenty high. Mn and Fe are low, while Cu is sufficient. Organic matter is above average. Soil pH is moderately alkaline, while salts are favorably lower.

Fertility and chemical data used here to formulate a recommendation was processed and reported by Soil Test, Inc., and Agrimanagement, Inc. soil lab for deep profile nitrates.
Fertility Report

George DeRuyter & Sons (Y281)

Field: GDS-SU-11  Acres: 8.1  Sample Date: 10/16/2013
Crop: Alfalfa  Irrigation: Wheel line  Previous Crop: 2013 Triticale-Sudan grass

Soil series: Warden silt loam  Leach Hazard: Low  No. of Sites: 18
Topography: Avg Sampling Depth: 2.7
Restrictive layer? Y  Where? Scattered areas of moderately to significantly compacted soil in the 20-36" range.
Residue Incorp? N  Type? Light Sudan residue.


<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>ppm Mobile Nutrients (lbs/ac)</th>
<th>Exch. / Soluble Bases (meq/100g)</th>
<th>Other Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>NO₃</td>
<td>NO₂</td>
<td>NH₄</td>
</tr>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>39</td>
<td>132</td>
<td>9</td>
</tr>
<tr>
<td>Field Composite</td>
<td>2'</td>
<td>38</td>
<td>129</td>
<td></td>
</tr>
<tr>
<td>Field Composite</td>
<td>3'</td>
<td>31</td>
<td>104</td>
<td></td>
</tr>
<tr>
<td>Totals:</td>
<td></td>
<td>365</td>
<td>8</td>
<td>116</td>
</tr>
</tbody>
</table>

Comments: Residual nitrates are high. Ammonium is in equilibrium. Sulfur and boron are plenty high. Sodium is only slightly elevated.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>Immobile Nutrients (ppm)</th>
<th>Chemical Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>P(Feox)</td>
<td>K</td>
</tr>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>161</td>
<td>903</td>
</tr>
</tbody>
</table>

Comments: Soil P, K, and Zn are high. Mn is low, while Fe and Cu are sufficient. Organic matter is high. Soil pH is medium alkaline, while salts are favorably low.

Fertility and chemical data used here to formulate a recommendation was processed and reported by Soil Test, Inc., and Agrimanagement, Inc. soil lab for deep profile nitrates.
Fertility Report

George DeRuyter & Sons (Y281)

Field: GDS-SU-12  
Acres: 40.5  
Crop: Triticale-Silage Corn  
Irrigation: Rill

Sample Date: 10/7/2013  
Previous Crop: 2013 Triticale-Silage corn  
Current Crop: 2014 Triticale-Silage corn

Soil series: Warden silt loam  
Leach Hazard: Low  
No. of Sites: 25

Topography: Very gentle to gentle S-SW slope  
Avg Sampling Depth: 2.8

Restrictive layer? Y  
Where? Compacted soil and rocks in scattered sites.

Residue Incorp? Y  
Type? Light stalks.

Comments: Sampled a three foot field composite. Stalk diameter is generally okay. Some small weed patches. Closely planted in the West Half.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>NO₃</th>
<th>NO₂</th>
<th>NH₄</th>
<th>SO₄</th>
<th>B</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>Na</th>
<th>T.B.</th>
<th>CEC</th>
<th>VolWt</th>
<th>%AW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>168</td>
<td>570</td>
<td>9</td>
<td>670</td>
<td>3.0</td>
<td>21.30</td>
<td>4.20</td>
<td>1.73</td>
<td>0.59</td>
<td>27.82</td>
<td>16.1</td>
<td>1.25</td>
<td>80%</td>
</tr>
<tr>
<td>Field Composite</td>
<td>2'</td>
<td>125</td>
<td>426</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.25</td>
<td>88%</td>
</tr>
<tr>
<td>Field Composite</td>
<td>3'</td>
<td>95</td>
<td>322</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.25</td>
<td>95%</td>
</tr>
<tr>
<td>Totals:</td>
<td></td>
<td>1318</td>
<td>8</td>
<td>670</td>
<td>3.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments: The residual nitrates are high. Ammonium is in equilibrium. Sulfur is high, while boron is sufficient. Sodium is only slightly elevated.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>P (ppm)</th>
<th>K</th>
<th>Mn</th>
<th>Fe</th>
<th>Cu</th>
<th>O.M.</th>
<th>pH</th>
<th>EC mmhos/cm</th>
<th>Eff/Calc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>154</td>
<td>675</td>
<td>6.0</td>
<td>3</td>
<td>26</td>
<td>1.6</td>
<td>3.4%</td>
<td>7.2</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments: The soil P, K, and Zn are high. Mn is low, while Fe and Cu are sufficient. Organic matter is high. The soil pH is near neutral, while salts are slightly elevated.

Comments: Given the scattered soil compaction, it is recommended that you could do some ripping. Ripping is best done when the soil profile is slightly moist (as post harvest in the fall).

Fertility and chemical data used here to formulate a recommendation was processed and reported by Soil Test, Inc., and Agrimanagement, Inc. soil lab for deep profile nitrates.
# Fertility Report

**George DeRuyter & Sons (Y281)**

**Field:** GDS-SU-13  
**Acres:** 47  
**Crop:** Alfalfa  
**Irrigation:** Wheel line

**Sample Date:** 10/15/2013  
**Previous Crop:** 2013 Alfalfa  
**Current Crop:** 2014 Alfalfa

**Soil series:** Warden silt loam  
**Leach Hazard:** Low  
**No. of Sites:** 25  
**Avg Sampling Depth:** 3.0

**Comments:** Sampled a three foot field composite. Post harvest. Light to moderate weeds in the swale.

## Mobile Nutrients (lbs/ac)

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>NO₃</th>
<th>NO₃</th>
<th>NH₄</th>
<th>SO₄</th>
<th>B</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>Na</th>
<th>T.B.</th>
<th>CEC</th>
<th>Vol/Wt</th>
<th>%AW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duplicate</td>
<td>1'</td>
<td>10</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td>19.70</td>
<td>3.50</td>
<td>0.60</td>
<td>0.27</td>
<td>24.07</td>
<td>1.25</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>10</td>
<td>35</td>
<td>3</td>
<td>95</td>
<td>1.3</td>
<td>19.70</td>
<td>3.50</td>
<td>0.60</td>
<td>0.27</td>
<td>24.07</td>
<td>1.25</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Field Composite</td>
<td>2'</td>
<td>7</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Composite</td>
<td>3'</td>
<td>8</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals:</td>
<td></td>
<td>34</td>
<td>86</td>
<td>3</td>
<td>95</td>
<td>1.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:** Residual nitrates are low. Ammonium is in equilibrium. Sulfur is sufficient, while boron is low. Sodium is favorably low.

## Immobile Nutrients (ppm)

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>P(perc)</th>
<th>K</th>
<th>Mn</th>
<th>Fe</th>
<th>Cu</th>
<th>O.M.</th>
<th>pH</th>
<th>EC mmhos/cm</th>
<th>Eff/Calc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>104</td>
<td>233</td>
<td>3.6</td>
<td>0.8</td>
<td>9</td>
<td>1.2</td>
<td>2.0%</td>
<td>7.9</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Comments:** Soil P is high, while K is marginal to sufficient. Zn is adequate. Mn and Fe are low, while Cu is sufficient. Organic matter is above average. Soil pH is quite alkaline, while salts are favorably low.

**Comments:** Given the scattered soil compaction, it is recommended that you could do some deep ripping. Ripping is best done when the profile is slightly moist (as in the fall, post harvest).

---

Fertility and chemical data used here to formulate a recommendation was processed and reported by Soil Test, Inc., and Agrimanagement, Inc. soil lab for deep profile nitrates.
Fertility Report

George DeRuyter & Sons (Y281)

Field: GDS-SU-14  Acres: 65.2  Sample Date: 10/17/2013
Crop: Triticale-Sudan  Irrigation: Wheel line  Previous Crop: 2013 Alfalfa

Soil series: Warden silt loam  Leach Hazard: Low  Current Crop: 2014 Triticale-Sudan
Topography: Gently undulating  No. of Sites: 30

Restrictive layer? Y  Where? Some caliche in the cores.
Residue Incorp? N  Type? Alfalfa incorporated, Triticale planted.

Comments: Sampled a three foot field composite. At the time of sampling the Triticale was at 2-4" tall. Very light weeds. Scattered white soil, mainly on the knolls and steeper slopes. Under irrigation. The swales were pretty wet.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>NO₃</th>
<th>NO₃</th>
<th>NH₄</th>
<th>SO₄</th>
<th>B</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>Na</th>
<th>T.B.</th>
<th>CEC</th>
<th>Vo/Wt</th>
<th>%A.W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>37</td>
<td>127</td>
<td>6</td>
<td>109</td>
<td>1.4</td>
<td>19.80</td>
<td>3.90</td>
<td>1.03</td>
<td>0.36</td>
<td>25.11</td>
<td>16.6</td>
<td>1.25</td>
<td>105%</td>
</tr>
<tr>
<td>Field Composite</td>
<td>2'</td>
<td>32</td>
<td>107</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.25</td>
<td>95%</td>
</tr>
<tr>
<td>Field Composite</td>
<td>3'</td>
<td>21</td>
<td>71</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.25</td>
<td>110%</td>
</tr>
<tr>
<td>Totals:</td>
<td></td>
<td>305</td>
<td>6</td>
<td>109</td>
<td>1.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments: Residual nitrates are high. Ammonium is in equilibrium. Sulfur is high, while boron is low. Sodium is favorably lower.

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Depth</th>
<th>P(Feo)</th>
<th>Zn</th>
<th>Mn</th>
<th>Fe</th>
<th>Cu</th>
<th>O.M.</th>
<th>pH</th>
<th>EC mhos/cm</th>
<th>Eff/Calc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Composite</td>
<td>1'</td>
<td>57</td>
<td>402</td>
<td>3.0</td>
<td>1.7</td>
<td>19</td>
<td>1.9%</td>
<td>7.7</td>
<td>0.40</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Comments: Soil P, K, and Zn are sufficiently high. Mn is low, while Fe and Cu are sufficient. Organic matter is slightly above average. Soil pH is alkaline and salts are favorably low.

Fertility and chemical data used here to formulate a recommendation was processed and reported by Soil Test, Inc., and Agrimanagement, Inc. soil lab for deep profile nitrates.
Ted Sturdevant, Director
Department of Ecology
300 Desmond Drive Southeast
Lacey, Washington 98503

Dan Newhouse, Director
Department of Agriculture
1111 Washington Street Southeast
Olympia, WA 98504

Dear Mr. Sturdevant and Mr. Newhouse:

I understand that your agencies are working on proposals to modify the requirements for livestock operations and would like EPA’s perspectives regarding protection of groundwater which is used as a source of drinking water. Our primary goal in this regard is to reduce risk to human health from nitrate contamination in underground sources of drinking water. We believe there are three main areas that the current requirements, as we understand them, could be significantly improved.

First, the state should prohibit in most instances the construction of manure lagoons on sites that have a significant risk of nitrate transport to groundwater that serves as a source of drinking water. Where there are no feasible alternatives to the construction of such lagoons, the state should prescribe requirements for liner design, construction, review and certification that will prevent groundwater contamination. Existing manure lagoons in areas with documented groundwater quality problems should be assessed to determine if they are discharging to groundwater and brought up to new standards if needed. My staff can provide more detail on programs from other states that could be looked to as a model.

Second, the state should require that livestock operations and third party recipients of waste that land apply liquid and/or solid waste take additional steps to ensure that manure application fields are not a source of nitrate to the groundwater. It is our understanding that the application of manure that has been transferred to a third party is currently not regulated. All parties applying manure or manure in combination with synthetic fertilizer, including third parties, should implement annual nutrient management plans based on current, annual soil and waste analysis, and application rates should be limited to agronomic rates. Irrigation management practices should also be prescribed to prevent downward migration of nitrates.

Third, the state should impose groundwater-monitoring requirements on large livestock operations that are potential significant sources of nitrates to a drinking water aquifer. The specific monitoring system should be designed by a licensed hydrogeologist and include both upgradient and downgradient monitoring. Where nitrate contamination is detected by the monitoring system, the state should require the facility to take additional steps to address the sources. Additional steps should include reduced application rates of nutrients as determined by on site analysis.
The EPA believes that having safe drinking water and a healthy agricultural economy are complementary goals that can be achieved. My technical staff is available to provide more details if needed. Please contact me directly or have your staff contact Tom Eaton, Director of our Washington Operations Office at (360) 753-8086 or by email at eaton.thomas@epa.gov.

Sincerely,

Dennis J. McLerran
Regional Administrator

cc: Mark Clark, Executive Director
Washington State Conservation Commission
Executive Summary

Agricultural activities, especially from Concentrated Animal Feeding Operations (CAFOs), may be causing a negative impact to public health through air and drinking water exposures. We have been working with U.S. EPA and state agencies in the lower Yakima River valley to identify and address the public health concerns. These concerns are not unique to the Yakima River valley. We have been working with several small utilities in Whatcom County for the past several years to address their contaminated water supplies. Other areas of the state may also impacted, as are other parts of the country.

Background

Health Impacts of Nitrate Contamination

Nitrate is an acute contaminant with a maximum contaminant limit (MCL) for drinking water of 10 milligrams per liter. High nitrate is especially dangerous for infants and pregnant women. Infants exposed to high amounts of nitrate may develop oxygen deprivation or “blue baby syndrome.” There is additional research being done to determine other health effects of nitrate. This includes:

- There is some limited indirect evidence that nitrate and nitrite from dietary exposure could be responsible for particular health outcomes including certain cancers; specifically cancers of the digestive system associated with elevated concentrations of nitrate in drinking water.

- There is a growing body of evidence suggesting that low levels of nitrite and nitrate, readily obtained from diet such as through green leafy vegetables, have beneficial effects; specifically potential beneficial cardiovascular effects.

- There may be sub-groups sensitive to the effects of nitrates. These would include individuals; with increased rates of endogenous (internal) formation of carcinogenic compounds (N-nitroso), with bilharzia (Schistosomiasis), with inflammatory bowel disease, smoking.

- There may be a difference in dietary nitrate intake and cancer and as compared to nitrate intake from drinking water and cancer.

Sources of Nitrate Contamination

Many sources contribute to nitrate contamination of aquifers, including agricultural waste and human sewage. The U.S. EPA (EPA), with authority under both the Safe Drinking Water Act (SDWA) and the Clean Water Act, has been discussing with states how to integrate and coordinate actions between water pollution permitting and drinking water quality protection as part of providing more comprehensive
environmental and public health protection. Understanding and addressing nitrogen (and phosphorus) impacts is a priority focus of EPA’s Nancy Stoner.

**Our Efforts: Drinking Water Protection**

We have been working closely with Ecology and Natural Resource Conservation Service (NRCS) to provide guidance on the nutrient management best management practice (BMP) standard that governs how NRCS funding will be used. For example, we provided NRCS our Group A public water system location and wellhead protection area data and suggested their nutrient application guidance factor in proximity to drinking water sources. We also commented to Ecology on the CAFO NPDES Permit revision, with a focus on ensuring manure not be applied as fertilizer in close proximity to Group A drinking water sources.

EPA is looking at how they prioritize activities to best leverage existing tools, authorities, and resources—including both activities they regulate (such as CAFO permits, stormwater permits, other NPDES permits, and approving Section 319 grants) and other agencies’ programs, such as USDA. EPA expressed interest in targeting activities toward protecting sources of drinking water, including working with the agricultural community to prioritize activities and leverage authorities.

The Department of Health’s statutory authority for drinking water protection is in the regulation of public water supplies, and does not include authority over single-family residences. For example, the department has authority to:

- Require a system to install and maintain treatment to meet SDWA standards,
- Require public water systems to develop plans that ensure availability of safe and reliable drinking water,
- Enter public water system premises to test or inspect the water system.

**EPA has broader authority under the SDWA Section 1431 to take action in situations where**

- A contaminant is present in or likely to enter an underground source of drinking water,
- The contaminant may present an “imminent and substantial endangerment” to human health, and
- State or local officials have not taken adequate action.

This authority may include actions that protect both public water and single-family residence’s water supplies. We do not have similar broad authority to take action in these cases.

**Yakima River basin.** Most residents in the lower valley of the Yakima River basin rely on shallow private wells for their drinking water. Unsafe levels of nitrate, coliform bacteria and other microbial contaminants have been found in samples. Contamination has been linked to agricultural activities and on-site sewage systems.

Work began in the Yakima River basin in fall 2008 when EPA called a public meeting in response to citizen complaints. Between 2009 and 2010, EPA conducted a voluntary sampling program and found elevated nitrates in 20 percent of samples. We participated in multiple meetings and conference calls with EPA regarding CAFOs and Yakima Valley ground water. We developed a brochure on Nitrates to be included in correspondence from EPA to private well owners regarding their initial sampling. We reviewed spreadsheets from EPA regarding 190 contaminants that were analyzed in subsequent, comprehensive sampling of 25 private wells with elevated levels of nitrates. The purpose of this
comprehensive sampling was to try to identify the source as well as other contaminants. Sampling results and conclusions will be provided at a public meeting in Yakima on September 27, 2012. In the 2010 legislative session, the Legislature provided us with $500,000 to fund nitrate treatment for individual homeowners in the Yakima River basin, and to support the formation of a groundwater management area (GWMA). Since then Yakima County petitioned Ecology to form the GMWA, and Ecology approved the formation of the committee.

Four public water system wells in the Lower Yakima Valley have been replaced due to high nitrates. These are Mabton, Grandview, Outlook School District, and Carriage Hill Estates. Replacement included drilling new wells, and in the case of Carriage Hill Estates, connecting to City of Yakima. See Map

**Whatcom County.** We have been recently meeting with staff from Ecology and the City of Lynden about possible solutions to nitrate contamination in an aquifer that supplies numerous small public water systems. The aquifer in this area is contaminated from agricultural activities, as farmers use manure to fertilize their crops and nutrients leach from the manure. We have been aware of and working on this problem for many years, but potential options all have been unaffordable or politically challenging.

We are getting closer to a solution though. Lynden is willing to supply water to the contaminated areas as soon as possible but must minimize its legal exposure. Bellingham may be willing to lease water to Lynden, but wants to retain control of the water right to support future industrial needs. The goal would be to develop a Bellingham-Lynden agreement within six months. Bellingham Mayor Kelli Linville is aware of the situation. We are still in process of working with Ecology for an agency directors briefing on the issues and potential short-term and long-term solutions.

**Sequim.** We are unaware of any health issues in the Sequim area relating to CAFOs and nitrate contaminated drinking water. All the public water systems within one mile of Mr. Clapp’s property have nitrate concentrations at or below 1 mg/L. Potentially, individual wells that are withdrawing from a shallow aquifer may have higher nitrate concentrations, but if so, we are unaware of problems. See Map

**Royal City.** One of Royal City public water system’s wells, which was over 1,000 feet deep, exceeded the nitrate MCL of 10 mg/L. The utility took that well offline. Another well, which is almost 1,000 feet deep has nitrate concentrations between 5 mg/L and 10 mg/L. Contamination at these depths are typically associated with fertilizer application. We are not aware of any public health concerns or any reported illnesses in this area.

In the surrounding area we are aware of three other public water systems that have high nitrate levels and will need to treat or drill new wells in the near future. They are: Beverly Water District, Royal Pacific Orchard, and Valley Fruit. See Map

**Our Efforts: Air Quality**

We’ve worked with numerous local, state and federal agencies about air quality issues associated with CAFOs in the Yakima Valley. The Yakima Clean Air Authority and WSU have been working on a pilot looking at best management practices for control of air pollutants associated with dairy operations. EPA’s Air Toxics staff is currently conducting air specific monitoring work on the Yakama Reservation. Ecology is conducting aerosol nitrate monitoring in Yakima and Toppenish.
A recent study showed increased cow allergen, ammonia and particulate matter in homes near CAFOs. Not surprising, levels decreased the further away the monitors were from the source. This study (http://www.ehjournal.net/content/10/1/72), although cursory, identified the potential for community exposures to agents with known human effects. Some of these airborne contaminants may be associated with skin immunologic responses (e.g., cow allergens).

Dr. Karr, UW Pediatrician, is currently involved in a study to try and determine sources of environmental triggers, such as agricultural chemicals, dust, pollen and others, for asthma in rural farm worker’s children.

Royal City. The Department of Health nor local health are aware of any reported health issues associated with dairies or CAFOs in Royal City.

Our Efforts: Shellfish Beds

We are working in cooperation with Ecology to provide EPA grants to Puget Sound area organizations to fund pollution identification and correction (PIC) programs. The purpose of PIC programs is to identify and correct pathogen, nutrient, and sediment pollution from a variety of nonpoint sources, including onsite sewage systems, farm animals, pets, sewage from boats, and stormwater runoff.

We currently have contracts with Hood Canal Coordinating Council, King County, Kitsap County, Mason County, Pierce County, San Juan County, Skagit County, and Thurston County. We are in negotiations with Whatcom County around a Pollution Control Action Team (“PCAT”), which is a variation on PIC given the county’s and Conservation District’s unique roles there. Supporting PIC programs in counties with larger amounts of agricultural lands like in Skagit and Whatcom counties is challenging (e.g., Samish Bay). Additional information on the establishment of PIC programs is provided in Ecology’s briefing paper titled Improved Manure Management Opportunities.

Next Steps

Drinking Water. We believe we could make better progress at protecting drinking water supplies if there was more coordination between the agencies on Nutrient Reduction Strategies and Source Water Protection activities.

EPA has a Nitrogen/Phosphorus Data Access Tool designed to help prioritize watersheds for load reduction goals and strategies (http://www.epa.gov/nutrientpollution/npdat). We think it would be beneficial to better link the Clean Water Act efforts with the Safe Drinking Water Act efforts to use this tool or build on it to reduce nitrogen and phosphorus pollution in WA.

Target state conservationist activities in areas that protect sources of drinking water. NRCS funds activities around the state (and the nation). Getting those funds targeted to not only protect surface water sources, but drinking water sources would go a long way to protect public health.
Specific Actions related to dairies and CAFOs.

Work on ensuring dairies and CAFOs not apply or dispose of any manure within a public water system’s drinking water source’s five year time of travel. Ensure groundwater sampling around animal operations. This would not only help to prevent public water systems, but private well owners as well.

Require farmers to only fertilize to agronomic rates within a drinking water source’s five year time of travel and take monthly groundwater samples the entire time they are fertilizing to ensure they are keeping the levels appropriate.

Work with farmers to change irrigation practices around drinking water wells.

Air Quality.

We have location information for the relatively small number of dairy operations (444) in Washington, and could possibly look at the incidence of asthma relative to these locations. We do not have location information for CAFOs.

Other Health Issues.

Working with Ecology and EPA, we could target concentrated animal feeding operations or other agricultural practices, and investigate the occurrence of specific health concerns for which people are hospitalized as a result of some exposure; and

If we receive complaints of similar health conditions within a localized area, we could initiate a cluster investigation in collaboration with local health following established agency protocols.