

James E. Rosenberg Public Comment on Draft-550-3000-001 Standards and Guidelines for Identifying, Tracking, and Resolving Oil and Gas Violations

Pursuant to PA Bulletin 44 Pa.B. 6290 and 44 Pa.B. 6853, I wish to submit the following public comments on the Pennsylvania Department of Environmental Protection (DEP) Office of Oil & Gas Management (OOGM) document: Technical Guidance Draft-550-3000-001, Standards and Guidelines for Identifying, Tracking, and Resolving Oil and Gas Violations (“Standards”).

1. Page i, Authority: Article 1 Section 27 of the PA Constitution must be cited as an authority.

Ignoring the plurality opinion of the Supreme Court of the Commonwealth of Pennsylvania in the Act 13 Case¹, DEP is continuing its outrageous, inexcusable, and politically motivated willful disregard of the plain meaning of the words of Article 1 Section 27 of the Constitution of the Commonwealth of Pennsylvania by failing to recognize Article 1 Section 27 as an authority for Standards. This must be corrected. DEP does not have the authority to perform a back door repeal of Article 1 Section 27 by omitting it from its list of authorities in Technical Guidance documents. Article 1 Section 27 must be inserted at ***the top of the list*** of authorities on Page i.

2. Page i, Authority: The Air Pollution Control Act must be added to the list of authorities.

This issue is elaborated below, see point 10.

3. Page i, Disclaimer: There is no mechanism for informing the public about deviations from Standards.

The Disclaimer on Page i states: “The Department reserves the discretion to deviate from this policy statement if circumstances warrant.” So, why are we even going through this exercise? Is Standards a policy document, or not? A generous-minded citizen is willing to grant that an endeavor as complex as unconventional Oil & Gas drilling may require ***occasional*** flexibility. But on those occasions where DEP considers itself justified in disregarding its own stated policies, ***the public must be informed*** and given an opportunity to comment. Without such a mechanism, the very concept of “policy” is rendered meaningless.

4. Page 1, Goal: Protection of the public health, safety, and welfare must be added to the description of DEP’s primary objective.

The first paragraph of Page 1 baldly confesses: “the primary objective of the enforcement program is to attain and maintain a high degree of compliance with the laws governing oil and gas ***development***.” (Emphasis added). One’s breath is taken away by the naked candor of this admission of perversion of DEP’s actual mission, which is protection of the environment, and thereby protection of the public health safety and welfare. It is sad beyond measure to have to point out in plain English that the ***objective*** of DEP is ***not*** oil and gas ***development***. This paragraph must be amended. DEP should be ashamed of itself for this wording. That this paragraph as written does in fact encapsulate the shameful practices that are actually occurring in the field (details below) is not an excuse.

5. Page 1, Basic Principles: NOV must be issued *in every case* where there has been a violation.

There have been numerous circumstances in the field where violations have occurred but no Notice Of Violation (NOV) was issued. This must stop, and must absolutely not be elevated to being policy. Examples:

1 <http://blogs.law.widener.edu/envirolawcenter/files/2013/12/J-127A-D-2012oajc1.pdf>

A. Operator-reported spills that have been “cleaned up” by the time of inspection are recorded as “In Compliance with Policy” (no NOV).

There are several reasons why failure to write NOV when a violation has occurred is harmful:

- Inspection search in eFACTS produces no text if there was no violation. This means that operator-reported violations are basically missing from eFACTS.
- The Oil & Gas Compliance Report can search on inspections with violations only, but not the “In Compliance” case. (There is no way to search for only inspections that do not have status “No Violations Noted”.)

The net effect is to hide from the public cases where there has been a violation but the operator has become “in compliance” by the time of an inspection. This is unacceptable. A violation is a violation, and should be recorded as such.

B. There are several kinds of violations that have often not been written up as violations, but (improperly) only recorded in inspection report Comments. Examples include:

- Leaking wells

Peer reviewed research using data mining methods on DEP inspection reports has revealed numerous cases of leaking wells (e.g. “leaking in the cellar”) that were only noted as such in the Comments field of the report — no NOV written.²

- Cement failure

Appendix A shows an example of an inspection report for a complete cement failure for an unconventional gas well in Fayette County. This situation resulted in a total failure of drilling this well, requiring a whole new permit to drill the well over again. Because there was no NOV, a search by “result” will classify this well as a “no-problem” well. This is completely misleading. Far from “no-problem”, this is a case of **total well construction failure**.

One might reasonably inquire in this case: where did the cement go? Lost in an undocumented coal mine void perhaps? *What is the risk* for other wells on this same pad? What lessons can be learned from this event? These are legitimate questions, that might well be asked by industry, DEP, environmental groups, and concerned citizens. But research into such questions is only possible if there is a recording of an anomaly.

- Underground explosion

Appendix B shows two inspection reports documenting an **underground explosion** at Sheperd 6H in Redstone Twp, Fayette County. This case is very disturbing. While there was an NOV issued, it was administrative only, and only for failure to report, not for the substance of the actual accident. Area residents reported anecdotally that an explosion of some kind occurred in this vicinity. While the inspection reports don’t actually mention the word ‘explosion’, this conclusion is clear based on comments in the inspection reports, as follows. Inspection ID 2266784 reports that “THE TUBING WAS SEPERATED [sic] BY **PERFORATIONS** [sic] @ 6215’.” [Emphasis added.] Inspection ID 2206094 reports that there was “LOSS OF PRESSURE DOWN HOLE” and “COULD NOT GET PASS [sic] 8342’ []DEPTH DOWN HOLE.”

2 Anthony R. Ingraffea, Martin T. Wells, Renee L. Santoro, and Seth B. Shonkoff, “Assessment and risk analysis of casing and cement impairment in oil and gas wells in Pennsylvania, 2000–2012”, Proceedings of the National Academy of Sciences, vol. 111 no. 30, 10955–10960, doi: 10.1073/pnas.1323422111, <http://www.pnas.org/content/111/30/10955>.

Together, these comments indicate that the casing was perforated more than two thousand feet above the producing interval: clear sign of an explosion.

An underground explosion is an extremely serious accident. The fact that it takes alert citizens to point this out, and to even bring out word that it happened, shows conclusively that DEP's NOV and enforcement policies are completely broken. Why was there no full investigation in this case? Why was the only NOV "administrative" for failure to report? Where is DEP's report on this accident, providing best guidance to both industry and DEP as to how to prevent such accidents in the future? What caused this explosion? What is the risk for other future wells in this vicinity?

6. Page 2, Enforcement Priorities: An item needs to be added regarding well engineering risk.

To the list of priorities I suggest adding the following item:

Any condition which is likely to pose a threat to the integrity of a well, well bore, well casing, or pressure containment.

7. Page 3 Section A Paragraph 3: Operator-reported issues must be included.

This paragraph begins with the following sentence:

"All violations identified *during an inspection* will be documented in writing in the inspection report on the date of the inspection and should be presented to the facility before concluding the inspection, if possible." [Emphasis added.] This should be amended to read:

"All violations identified during an inspection, or identified from communications by an operator prior to an inspection, will be documented in writing in the inspection report on the date of the inspection and should be presented to the facility before concluding the inspection, if possible."

8. Page 6: CACP documents must be published on DEP's web site.

Consent Assessment of Civil Penalty (CACP) documents are important public documents. They must be published in a prominent place on DEP's web site, in such a way that they can be searched, especially by operator. The public needs to be able to see exactly what the operator agreed to. It is not reasonable to require of the public that we infer a CACP has been agreed to and then file a Right To Know request to be able to obtain the text. Likewise for all other forms of negotiated settlement.

Likewise, CEP (Community Enforcement Project) documents and Negotiated Agreements must also be published.

It is evident in this regard that DEP does not have a proper Internet-available docket system. This should be remedied, and all agreements that are part of an enforcement should be entered via the docket system.

9. Page 10, Frequency of Well Inspections: Every well should be inspected at least once per stage/event.

This section begins with the following instruction: "Each District Office should ensure that all wells are inspected at least once in accordance with the following schedule:" followed by a list a)-l) of stages or events in the history of a well. As drafted this could be read as accepting that a well need only be inspected once in the entire history of the well. This is completely unacceptable. Each well must be inspected at **every** stage, and every event (such as a complaint or "incident").

10. Page 14: Coordination with other Department or Agency Programs: Specific mention must be made of coordination with BAQ regarding compliance with 40 CFR Part 60, Subpart OOOO.

Historically, Oil & Gas wells were determined by DEP's Bureau of Air Quality (BAQ) to be *exempt* from requiring an air quality permit. BAQ maintains a list of exemptions from the requirements of Plan Approvals — i.e. Air Quality Permits — in which the exemption for an Oil & Gas well is #38. On August 16, 2012, EPA published a final rule “Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews”³ subjecting unconventional Oil & Gas wells to the Clean Air Act under 40 CFR Part 60, Subpart OOOO. BAQ subsequently modified its exemption Technical Guidance on August 10, 2013 to take account of 40 CFR Part 60, Subpart OOOO.⁴ BAQ now gives the operator of an Oil & Gas well two choices: apply for an Air Quality General Plan Approval under BAQ-GP-5, or retain Exemption 38 but “demonstrate” compliance with 40 CFR Part 60, Subpart OOOO. Unfortunately, this latter choice is fraught with problems.

- Absent an application under GP-5, how is BAQ to be informed about well sites for which compliance with 40 CFR Part 60, Subpart OOOO needs to be “demonstrated”?
- Has OOGM been properly informed by BAQ concerning what “states” a well has to be in for determining compliance with 40 CFR Part 60, Subpart OOOO?
- What sort of documentation is produced concerning determination of compliance with 40 CFR Part 60, Subpart OOOO?

What “file” does that documentation go in? Is it supposed to be part of the File Review documents for a well site maintained by OOGM? Note that from the standpoint of the public, there is a nasty catch-22 here: in order to do File Review, we are required to supply a **Permit Number**. Absent a GP-5, *there is no permit number* maintained by BAQ, but there are permit numbers maintained by OOGM. But presumably OOGM knows nothing about 40 CFR Part 60, Subpart OOOO since that is an air quality issue and air quality issues are handled by BAQ.

- Is there an eFACTS authorization for verifying compliance with 40 CFR Part 60, Subpart OOOO? If there is not, there should be! If there is, it is not being made available to the public, and is certainly not *linked* from any of the eFACTS records for wells and well sites maintained by OOGM.

These issues need to be resolved. In fact, it appears to the public that for well sites without any GP-5 (which is almost all of them) “demonstration” of compliance with 40 CFR Part 60, Subpart OOOO is simply not occurring in any fashion. This is unacceptable.

Of course there's a very simple solution to this problem, the solution that should have been adopted: **BAQ should rescind Exemption 38 completely**. BAQ was urged to do so in Public Comment, but they refused. By rescinding Exemption 38 for unconventional Oil & Gas wells and requiring that their operators submit applications under BAQ-GP-5, this entire picture becomes simplified:

- The currently non-existent “file” for 40 CFR Part 60, Subpart OOOO becomes no longer a mystery, but is just the normal kind of file maintained by BAQ for a GP-5.
- “Demonstration” of 40 CFR Part 60, Subpart OOOO would be handled by BAQ, as it should be, as a normal part of the GP-5 inspection process.

³ Federal Register Vol. 77, No. 159, p. 49490.

⁴ “Air Quality Permit Exemptions”, Document Number: 275-2101-003, <http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-96215/275-2101-003.pdf>

- eFACTS authorizations for 40 CFR Part 60, Subpart OOOO compliance occur through the normal eFACTS GP-5 process.

I would like to take this opportunity to invite OOGM to use its best efforts to urge BAQ to reopen 275-2101-003 and completely rescind Exemption 38 for unconventional Oil & Gas wells. Absent that, Standards needs explicit mention of the 40 CFR Part 60, Subpart OOOO issue.

11. Page 14: Coordination with other Department or Agency Programs: Specific mention must be made of coordination with the Bureau of Waste Management (BWM).

There are numerous problems in eFACTS regarding the interaction of OOGM and BWM — from both ends:

- The eFACTS records for wells / well sites have no links to the facilities receiving waste for that well or well site.
- The eFACTS records for Form U submissions do not contain a Generator ID, or other form of link to well operators.

12. Page 14: Notifications: Notifications as listed in section B3 of Standards must be *published*.

The *state* that a well is in is public information and should also be *published* information. This could be accomplished via eNOTICE or through a column in a report listed on the Oil & Gas Reports web page queryable by date range.

13. Page 18: Water Supply Investigation Requests: Standards must include actual standards for what chemicals must be tested for and all test results must be disclosed.

One must begin with a question which is shockingly obvious: How can a document whose very title begins with the word ‘standards’ in fact contain no *standards* whatsoever for what chemicals must be tested for in a Water Supply Investigation? This issue has a storied history, both in the press, in public statements by DEP, before the Environmental Hearing Board⁵, and as one of the subjects of the Auditor General’s Performance Audit of DEP⁶. That water testing standards are not part of Draft-550-3000-001 — even as an appendix or reference — is ample testimony that this issue is far from settled. DEP *must* speak in Standards to the issue of the standards for testing samples of a water supply when conducting a contamination investigation. The public is not reassured by DEP’s response⁷ to the controversy surrounding the “Upadhyay Deposition”.⁸ Standards must be amended to include actual standards for water supply testing. At a minimum, all of the following chemicals or contaminants should be included, and *test results fully disclosed*:

- EPA’s drinking water standards (e.g. Method 200.⁹).

5 Environmental Hearing Board Case #2011149, Kiskadden vs. DEP, http://ehb.courtapps.com/public/document_shower_pub.php?csNameID=4351

6 Eugene A. DePasquale, Auditor General of Pennsylvania, “DEP’s Performance in Monitoring Potential Impacts to Water Quality from Shale Gas Development, 2009 - 2012”, Department of the Auditor General, Harrisburg, PA, July 2014, <http://www.auditorgen.state.pa.us/Media/Default/Reports/speDEP072114.pdf>

7 <http://bloximages.newyork1.vip.townnews.com/shalereporter.com/content/tncms/assets/v3/editorial/c/98/c987597e-2875-11e2-b71d-001a4bcf6878/5099b22a1f2cc.pdf.pdf>

8 <http://stateimpact.npr.org/pennsylvania/2012/11/02/dep-employee-says-agency-withholds-water-contamination-information-from-residents/>

9 <http://nepis.epa.gov/Exe/ZyNET.exe/P1002CW0.TXT?ZyActionD=ZyDocument&Client=EPA&Index=2000+Thru+2005&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A\zyfiles\Index>

- DEP’s own studies of produced water: Marcellus Inorganic Survey, “Suite Code 944”, 2008¹⁰.

Constituents of Suite Code 944 as detailed in a press account are listed in Appendix C. It is particularly striking that although Suite Code 944 was developed by DEP itself as the result of actual studies of Marcellus Shale produced water, the public is able to obtain the list of components in Suite Code 944 only as the result of (1) a deposition in an Environmental Hearing Board appeal of a Determination Letter that a water supply was “safe”^{*} and (2) a press Right To Know request based on press accounts of this deposition. That Standards does not in fact contain actual standards for testing a water supply is ample testimony to the unacceptable stonewalling in which DEP has engaged on this issue going back some two years or more, and continuing to the present day. ***This must stop!***

- What well operators are testing for in their own pre-drilling (“rebuttable presumption of liability”) tests.

Appendix D lists the parameters tested for in an actual driller’s “rebuttable presumption” (25 PA Code § 78.52) pre-drilling test. As DEP should not require reminding, 25 PA Code § 78.52(d) requires that such test results be sent to the DEP. It will be seen at once from Appendix D that this is an extremely elaborate test. Presumably, this driller has a reason for ordering a test for so many constituents. So why is DEP continuing to rely on such a narrow test as “Suite Code 942” or “Suite Code 946”?

- Constituents required to be tested for in DEP’s own waste management programs (Form 26R, Form U).

Appendix E shows a list of constituents to be analyzed in the annual report of a generator of residual waste, taken from part 2d of the Instructions for Form 26R¹¹. This is a considerably more elaborate list than “Suite Code 942” or “Suite Code 946”. The testing that DEP does itself in the investigation of contamination of a water supply by an unconventional Oil & Gas well should be at least this elaborate.

- All disclosed hydraulic fracturing chemicals (including those listed on fracfocus.org).

Of course ***all*** hydraulic fracturing chemicals should be disclosed. These in turn should be passed on to the testing lab to determine if they are present in a water supply being investigated for contamination.

There is a clear pattern here: DEP is requiring water testing by other parties that is much more strict than the testing it reports on itself. This is outrageous. Standards must be amended so that all these various forms of testing are consolidated and evaluated into a single list of requirements for what must be tested for in investigating contamination of a water supply and ***all test results must be disclosed.***

14. Page 19, item 12: Following an NOV, an administrative order to permanently restore or replace an adversely affected water supply must be issued in all cases, even if the operator has already acted.

Following “Within 30 calendar days following an operator’s written response to an NOV, the Department shall issue an administrative order to permanently restore or replace an adversely affected water supply unless:” the following text must be stricken:

%20Data\00thru05\Txt\00000016\P1002CW0.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h|&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=p|f&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results
%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL#

10 http://www.shalereporter.com/government/article_358a339a-6574-11e2-bef2-001a4bcf6878.html

* In the litigation for EHB case 2011149, DEP claimed that Determination Letter was not appealable, but was overruled.

11 “FORM 26R, CHEMICAL ANALYSIS OF RESIDUAL WASTE, ANNUAL REPORT BY THE GENERATOR, INSTRUCTIONS”, <http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-80512/01%20Instructions%202540-PM-BWM0347.pdf>

“(1) the water supply has already been restored or replaced;”

An operator may ostensibly “restore or replace” by variety of means, whose duration may not be permanent, and whose effectiveness may be subject to dispute. In a circumstance where a water supply has been contaminated, the well operator claims to have “restored or replaced”, and the owner disputes this claim, it is completely improper for the victim to be required *to go back* to DEP to seek an administrative order. The administrative order should be issued at the outset, and the burden of proof should be on the operator to show that the order was already satisfied when issued.

Respectfully submitted,

James E. Rosenberg
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November 18, 2014

Appendix A
Inspection Report Showing Cement Failure and No Violation

OPERATOR: CHEVRON APPALACHIA LLC

INSPECTION_ID: 2230850

INSPECTION_DATE: 11/13/13

INSPECTION_TYPE: Drilling/Alteration

API_PERMIT: 051-24569

FARM_NAME: RITTER UNIT 4H

UNCONVENTIONAL: Y

FACILITY_TYPE: Oil & Gas Location

INSPECTION_CATEGORY: Primary Facility

REGION: EP DOGO SWDO Dstr Off

COUNTY: Fayette

MUNICIPALITY: Redstone Twp

INSPECTION_RESULT_DESCRIPTION: **No Violations Noted**

INSPECTION_COMMENT: HORIZONTAL MARCELLUS, HIGHLANDS # 14 DRILLING ON AIR @ 2640'(TD). RUNNING INTERMEDIATE CASING AND CEMENTING TODAY (11/12/2013). F/S SET @ 2640' AND F/C SET @ 2595'. RECEIVED A CALL ON (11/13/2013) **NO RETURNS OF CEMENT**

DURING CEMENTING OF INTERMEDIATE CASING.REQUETED TIME UNDER REGULATION 78 -86 (DEFECTIVE CASING AND CEMENTING).HAVE UNTIL (12/13/2013) TO SUBMIT A PLAN TO THE DEPARTMENT. [Emphasis added.]

Appendix B

Inspection Reports Showing Underground *Explosion* and No Violation for the Accident

OPERATOR: CHEVRON APPALACHIA LLC

INSPECTION_ID: 2206094

INSPECTION_DATE: 09/23/13

INSPECTION_TYPE: Drilling/Alteration

API_PERMIT: 051-24511

FARM_NAME: SHEPERD UNIT 6H

UNCONVENTIONAL: Y

FACILITY_TYPE: Oil & Gas Location

INSPECTION_CATEGORY: Primary Facility

REGION: EP DOGO SWDO Dstr Off

COUNTY: Fayette

MUNICIPALITY: Redstone Twp

INSPECTION_RESULT_DESCRIPTION: Outstanding Violations - No Viols Req'd

INSPECTION_COMMENT: HORIZONTAL MARCELLUS, DURING FINAL OPERATION OF 3RD STAGE OF FRAC BEING PREFORM THE COMPANY MAN WAS ALERTED OF **LOSS OF PRESSURE DOWN HOLE**. ATTEMPTING TO SET BRIDGE PLUG AND PERFERATE NEXT ZONE THE OPERATOR DISCOVERS THEY **COULD NOT GET PASS 8342'**DEPTH DOWN HOLE. AT HHIS TIME OPERATOR DECIDES TO PREFORM A TEMP LOG TO LOCATE ANY PIPE INTERGITY ISSUES. AFTER LOG IS PERFORMED 2 — BRIDGE PLUGS ARE SET AT 3520' AND 3560'ON (7/30/2013). FURTHER TESTING IS BEING ARRANGED TO BE PERFORMED .

VIOLATION_ID: 678680

VIOLATION_DATE: 09/23/13

VIOLATION_CODE: 78.86 - **Failure to report** defective, insufficient, or improperly cemented casing w/in 24 hrs or submit plan to correct w/in 30 days

VIOLATION_TYPE: **Administrative**

VIOLATION_COMMENT:

RESOLVED_DATE: 09/23/13

RESOLUTION_REASON_CODE_DESCRIPTION: SCHED - Compliance Schedule Agreed To

ENFORCEMENT_ID:

ENFORCEMENT_CODE_DESCRIPTION:

DATE_EXECUTED:

PENALTY_FINAL_STATUS_CODE_DESCRIPTION:

PENALTY_FINAL_DATE:

ENFORCEMENT_FINAL_DATE:

PENALTY_AMOUNT:

TOTAL_AMOUNT_COLLECTED:

[Emphasis added.]

OPERATOR: CHEVRON APPALACHIA LLC

INSPECTION_ID: 2266784

INSPECTION_DATE: 04/29/14

INSPECTION_TYPE: Plugging(Includes Plugged/Mined Through)

API_PERMIT: 051-24511

FARM_NAME: SHEPERD UNIT 6H

UNCONVENTIONAL: Y

FACILITY_TYPE: Oil & Gas Location

INSPECTION_CATEGORY: Primary Facility

REGION: EP DOGO SWDO Dstr Off

COUNTY: Fayette

MUNICIPALITY: Redstone Twp

INSPECTION_RESULT_DESCRIPTION: **No Violations Noted**

INSPECTION_COMMENT: HORIZONTAL MARCELLUS,DURING PLUGGING OPERATIONS THE 2 3/8" UP-SET TUBING BECAME CEMENTED INSIDE 5 1/2" CASING DUE TO RETAINER FAILURE'.

CEMENT TOP IS @ 6250' LEAVING 735' OF 2 3/8" TUBING CEMENTED IN WELL BORE. **THE TUBING WAS SEPERATED BY PERFORATTIONS @ 6215'**. THIS LEFT A 35' STEM OF 2 3/8" TUBING TO BE COVERED BY CEMENT TO AVOID ANY GAPS OF CEMENTING THE VERTICAL 5 1/2" CASING. NO VIOLATION NOTED AT THIS TIME.

[Emphasis added.]

Appendix C
Parameters Listed in a Press Account of Suite Code 944

ammonia
Kjeldahl nitrogen
nitrate and nitrite
phosphorus
carbon
cyanide (distilled and weak acid dissociable)
sulfide
hardness
calcium
magnesium
sulfate
fluoride
arsenic
barium
beryllium
boron
cadmium
chromium
cobalt
copper
iron
lead
manganese
thallium
molybdenum
silver
zinc
antimony
tin
aluminum
selenium
titanium
phenols
mercury
pH
total suspended solids
total dissolved solids

(See text for the reference.)

Appendix D
Parameters Listed in a Driller's "Rebuttable Presumption" Pre-drilling Test
Fayette County Well, Summer 2013

Name	CAS #
Acrolein	107-02-08
Acrylonitrile	107-13-1
Benzene	71-43-2
Bromobenzene	108-86-1
Bromochloromethane	74-97-5
Bromodichloromethane	75-27-4
Bromoform	75-25-2
Bromomethane	74-83-9
2-Butanone	78-93-3
n-Butylbenzene	104-51-8
sec-Butylbenzene	135-98-8
tert-Butylbenzene	98-06-6
Carbon Tetrachloride	56-23-5
Chlorobenzene	108-90-7
Chloroethane	75-00-3
2-Chloroethyl vinyl ether	110-75-8
Chloroform	67-66-3
Chloromethane	74-87-3
2-Chlorotoluene	95-49-8
4-Chlorotoluene	106-43-4
1,2-Dibromo-3-chloropropane	96-12-8
Dibromochloromethane	124-48-1
Dibromomethane	74-95-3
1,2-Dichlorobenzene	95-50-1
1,3-Dichlorobenzene	541-73-1
1,4-Dichlorobenzene	106-46-7
Dichlorodifluoromethane	75-71-8
1,1-Dichloroethane	75-34-3
1,2-Dichloroethane	107-06-2
1,1-Dichloroethene	75-35-4
cis-1,2-Dichloroethene	156-59-2
trans-1,2-Dichloroethene	156-60-5
1,2-Dichloropropane	78-87-5
1,3-Dichloropropane	142-28-9
2,2-Dichloropropane	594-20-7
1,1-Dichloropropene	563-58-6
cis-1,3-Dichloropropene	10061-01-5
Ethylbenzene	100-41-4
Hexachlorobutadiene	87-68-3
2-Hexanone	591-78-6
Isopropylbenzene	98-82-8
p-Isopropyltoluene	99-87-6
Methyl Tertiary Butyl Ether	1634-04-4
4-Methyl-2-Pentanone	108-10-1

Methylene Chloride	75-09-2
n-Propylbenzene	103-65-1
1,1,1,2-Tetrachloroethane	630-20-6
1,1,2,2-Tetrachloroethane	79-34-5
Tetrachloroethene	127-18-4
Toluene	108-88-3
1,2,3-Trichlorobenzene	87-61-6
1,2,4-Trichlorobenzene	120-82-1
1,1,1-Trichloroethane	71-55-6
1,1,2-Trichloroethane	79-00-5
Trichloroethene	79-01-6
Trichlorofluoromethane	75-69-4
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
Vinyl Chloride	75-01-4
Xylene (Total)	1330-20-7

Ethane	74-84-0
Methane	74-82-8
Propane	74-98-6

Ethanol	64-17-5
Methanol	67-56-1

Ethylene glycol	107-21-1
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Boron	7440-42-8
Phosphorus	7723-14-0
Sulfur	7704-34-9

Aluminum	7429-90-5
Calcium	7440-70-2
Iron	7439-89-6
Magnesium	7439-95-4
Potassium	7440-09-7
Silicon	7440-21-3
Sodium	7440-23-5

Arsenic	7440-38-2
Barium	7440-39-3
Cadmium	7440-43-9
Chromium	7440-47-3
Cobalt	7440-48-4
Copper	7440-50-8
Lead	7439-92-1
Manganese	7439-96-5
Molybdenum	7439-98-7
Nickel	7440-02-0
Selenium	7782-49-2
Silver	7440-22-4
Strontium	7440-24-6

Vanadium 7440-62-2
Zinc 7440-66-6

Mercury 7439-97-6

Total Hardness as CaCO3 471-34-1

Bromide 24959-67-9
Chloride 16887-00-6
Sulfate 14808-79-8

Total Nitrite/Nitrate Nitrogen 7727-37-9

SGT-HEM (TPH)

Temperature of pH

Turbidity

Total Acidity

Total Alkalinity
Phenolphthalein Alkalinity

Specific Conductance

Total Dissolved Solids

Total Suspended Solids

pH

Sulfide 18496-25-8

M. B. A. S.

Total Coliform
E. coli

Gross Alpha
Gross Beta

Radium-226

Appendix E
Parameters Listed in Form 26R Instructions, Part 2d

Acidity
Alkalinity (Total as CaCO₃)
Aluminum
Ammonia Nitrogen
Arsenic
Barium
Benzene
Beryllium
Biochemical Oxygen Demand
Boron
Bromide
Cadmium
Calcium
Chemical Oxygen
Demand
Chlorides
Chromium
Cobalt
Copper
Ethylene Glycol
Gross Alpha
Gross Beta
Hardness (Total as CaCO₃)
Iron – Dissolved
Iron – Total
Lead
Lithium
Magnesium
Manganese
MBAS (Surfactants)
Mercury
Molybdenum
Nickel
Nitrite-Nitrate Nitrogen
Oil & Grease
pH
Phenolics (Total)
Radium 226
Radium 228
Selenium
Silver
Sodium
Specific Conductance
Strontium
Sulfates
Thorium
Toluene

Total Dissolved Solids
Total Kjeldahl Nitrogen
Total Suspended Solids
Uranium
Zinc