

Blue Book

**Department of Environmental Quality
Office of Oil, Gas, and Minerals**

04 - Supervisor's Letters

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

INTEROFFICE COMMUNICATION

October 19, 1992

XI-1992-2

SUPERVISOR'S LETTER

Letter No. 1992-2

Effective Date: October 19, 1992

TO: Geological Survey Division Field Staff and
Permits and Bonding Unit Staff

FROM: R. Thomas Segall, Chief, Geological Survey Division

SUBJECT: Re-entry of Plugged and Approved Wells

This Supervisor's Letter replaces the memorandum from James Lorenz dated September 13, 1983, to the Regional and District Geologists.

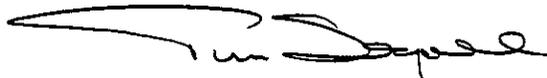
Mr. Lorenz's memorandum established a process whereby plugged wells could be re-entered through the issuance of a Change of Well Status (7200-6). In many cases, however, this process did not result in adequate review being given to critical aspects of the application, such as:

- Appropriate drilling unit and spacing
- A casing and sealing program
- Environmental Impact Assessment (pit, drilling fluid handling, Supervisor's Instructions)
- Blowout preventer configuration
- Proper bonding
- Eligibility of applicant for permits
- State lease verification/notification

This process has also resulted in errors to the mainframe database where wells are identified as plugged even though they were later re-opened by a Change of Well Status.

Henceforth, applications to re-enter wells which have been plugged and approved shall be issued a new drilling permit. A field review on the new permit application shall be performed in accordance with existing procedures. In addition, we shall no longer transfer permits for wells which have been plugged and approved.

If you have questions regarding this instruction, please contact Tom Wellman, Supervisor, Permits and Bonding Unit at 517-334-6974.



cc: Mr. Sam Alguire, DNR
Mr. Rodger Whitener, DNR
Mr. Michael Bricker, DNR
Mr. Ray Ellison, DNR

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

April 12, 1996

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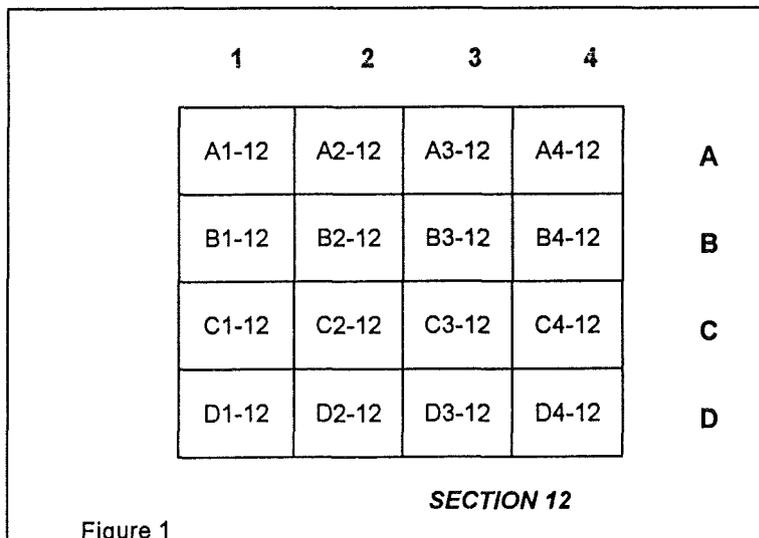
SUPERVISOR'S LETTER

Letter No.: 1993-1
Effective Date: December 22, 1993
Revised Date: April 12, 1996

TO: Geological Survey Division Staff
FROM: Rodger Whitener, Acting Chief, Geological Survey Division
SUBJECT: Tank Battery Naming Convention

To properly utilize the Field Activity System (FACTS), each tank battery (TB) and central production facility (CPF) must be assigned a unique name and number. The FACTS committee has established a format to standardize the naming of facilities and to delineate responsibility for data entry into the Mainframe.

The name of a facility is based on the lease or township name and a numbering grid as depicted on Figure 1 as shown below. Each quarter section has an assigned number and letter based on the position in the section and the section number. For example, NE NE NE Section 12 is A4-12. A unique number will be assigned by the Mainframe at the time of data entry. The Mainframe requires that production facilities be identified as either a TB or a CPF; all common tank batteries (CTB) are to be included in the TB category. This information will be downloaded/updated on your personal computer when the PERMIT file is downloaded from the Mainframe.



All staff involved with the identification, classification, and/or naming of tank batteries are to use the following guidelines:

1. Utilize established names, if in common use, for existing multiple well TBs or CTBs and CPFs. The naming convention will apply to unnamed facilities.
2. Existing single well TBs shall use the lease name and the well number as in the following example or utilize the convention for new TBs: Smith 1 TB or St. Cleon 2-25 TB.
3. All new TBs, CTBs, and CPFs shall be entered by the appropriate field staff using the lease name of the location of the facility and the numbering system shown in the diagram. A facility on the Jones lease located in NE NE NE Section 12 would be: Jones A4-12 TB. The Mainframe database should be checked prior to entering a new CPF to avoid duplicate entries.
4. Petroleum Geology and Production Unit (PGP) staff will query the Mainframe (or other database, as appropriate) for the CPF name upon receipt of an application from the operator for a CPF. If the CPF is named on the Mainframe, the PGP staff continues to use that name and number for the CPF. If the CPF is not named on the Mainframe, then the PGP staff names the CPF using the facility naming system (described above). The PGP staff will provide the District and Area Geologist with the company name, facility name, facility number, and location of the CPF. The PGP unit is responsible for the review and approval of the CPF.
5. When utilizing abbreviations, do not insert punctuation, e.g., ST, CO, USA, etc.

The FACTS committee will review the program and any proposed modifications on an annual basis. Suggestions for modifications should be sent to Wait Danyluk, Committee Chairperson. Current committee members are Larry Grabowski, Rick Henderson, or Lynne Boyd (TMT contact). Dave Forstat, RED, MDNR also serves on the committee.



cc: Dave Forstat, MDNR



JOHN ENGLER, Governor
DEPARTMENT OF ENVIRONMENTAL QUALITY
HOLLISTER BUILDING, PO BOX 30473, LANSING MI 48909-7973

RUSSELL J. HARDING, Director

REPLY TO:

GEOLOGICAL SURVEY DIVISION
735 E HAZEL ST
PO BOX 30256
LANSING MI 48909-7756

SUPERVISOR'S LETTER

Letter No: 1996-2
Effective Date: May, 3 1996

TO: Geological Survey Division Staff

FROM: Lynne M. Boyd, Acting Division Chief and Assistant Supervisor of Wells

SUBJECT: Soil Erosion and Sedimentation Control Plans

Director Russell J. Harding's April 2, 1996, memorandum on Soil Erosion and Sedimentation Control Plans (Plan) provides clarification regarding jurisdiction over soil erosion and sedimentation control at oil and gas sites. The two applicable regulations are Part 91, Soil Erosion and Sedimentation Control (Part 91) and Part 615, Supervisor of Wells (Part 615), of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. The clarification has a direct impact on our permitting process. Consequently, several questions have been generated regarding implementation. In response to those questions, the following guidance is provided.

Applicants for permits to drill and operate must submit a plan to mitigate soil erosion and sedimentation at well sites, access roads, flowlines, and surface facilities when earth changes for these operations will exceed an aggregate area of more than one acre or lie within 500 feet of a lake or stream. At present, erosion control plans should be incorporated in the Environmental Impact Assessment. Appropriate maps and cross-sections should be included, where needed. Oil and gas applicants can obtain a Part 91 permit in lieu of submitting a Plan as part of the Part 615 permit. If this option is chosen, the Part 91 permit must be included in the Part 615 permit application. If an applicant fails to submit a Part 91 permit or an adequate Plan as part of the Part 615 permit application, GSD staff will notify the applicant according to existing procedures for notification of application deficiencies. The Plan will become a condition of the Part 615 permit.

In some unique circumstances (e.g. wildcat wells), it may not be feasible for the applicant to determine the location of the surface facility, flowlines, and access roads to the surface facility, at the time of application for a permit to drill and operate. A permit condition will be incorporated by the Permits and Bonding Unit indicating that the construction of the surface facility, flowlines, and access roads to the surface facility can not begin until the Part 615 permit is amended with a complete Plan and approved by the District Geologist. The option of adding the permit condition should not become standard practice but rather reserved for those situations where a complete Plan would be unduly burdensome. To alert the Permits and Bonding Unit to incorporate the permit condition, a statement indicating that the

application does not address soil erosion and sedimentation at the surface facility should be added to the appropriate line on our permit transmittal form (currently #12).

Similar requirements apply to modifications of existing facilities that would involve earth changes, such as the relocation of a surface facility or replacement of a flowline. The operator must submit a Plan to the District Geologist and obtain approval prior to beginning the work.

Antrim projects shall be addressed under a consolidated Plan for the project. If the project is permitted in phases, a Plan shall be submitted for each phase. Individual well applications shall refer to the Plan submitted for the project. Upgrades on access roads needed to accommodate production operations shall be included in the Plan.

If a Plan is submitted with the Part 615 permit application, GSD will have enforcement authority for compliance with provisions of the Plan, and local enforcing agencies will not be able to assess a permit fee. Local enforcing agencies may collect fees for the inspection of flowlines and access roads. They may take enforcement action at these operations to require the operator to take appropriate remedial measures where accelerated erosion is occurring, whether or not such measures are identified in the Plan. Local enforcing agencies also retain enforcement authority for Part 91 permits.

Direction will be provided regarding minimum erosion control requirements and format for the Plans following completion of the efforts of the Oil and Gas Site Erosion Control Committee. Phase 2 Soil Erosion and Sedimentation Control training will be provided for appropriate staff following the establishment of Plan requirements.

Attachment



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

April 2, 1996

TO: Rodger Whitener, Acting Chief, Geological Survey Division
Larry Witte, Chief, Land & Water Management Division

FROM: 
Russell J. Harding, Director

SUBJECT: Soil Erosion and Sedimentation Control at Oil and Gas Sites

The issue of jurisdiction over soil erosion and sedimentation control at oil and gas sites has been in need of clarification for some time. Rule 1704 (g) of Part 91, Soil Erosion and Sedimentation Control, of the Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, as amended, states that oil, gas and mineral wells are exempt from the requirement for soil erosion and sedimentation permits if those wells are under permit from the Supervisor of Wells, and where the owner/operator of the wells is found by the Supervisor to be in compliance with the conditions of Part 91. Since the inception of Part 91 and its predecessor, PA 347 of 1972, as amended, there have been several interpretations of the intent of this permit exemption.

The most recent direction on this issue was set forth in a memorandum from Michael Moore, then Deputy Director of the Department of Natural Resources, dated September 28, 1993. I find it is necessary to revise and clarify the instructions in that memorandum. The memorandum indicated that county or local enforcing agencies have jurisdiction over flow lines for Antrim gas development projects. The stated reason was that Antrim gas operators in general were not in compliance with Part 91, due to their failure to properly address soil erosion and sedimentation control for flow lines in their applications for permits to drill and operate. I believe that this finding of noncompliance was too broad and not within the intent of the Part 91 rules.

Mr. Moore's memorandum also stated that county enforcing agencies have jurisdiction over access roads for oil and gas operations. However, it is the clear intent of Part 615, Supervisor of Wells, of the NREPA that the provisions of that part should take precedence in issues where there is potential conflict with other statutes. The jurisdiction under Part 615 extends to all phases of oil and gas drilling and production operations and is not limited to the wells alone. Access roads are a necessary and integral part of drilling and production operations.

Thus, I find that a Part 615 permit to drill and operate shall exempt the following from the requirement to obtain a Part 91 permit:

1. Well pads.
2. Flow lines (pipelines carrying oil, gas and brine from the wellhead to a production facility, or from the facility to an injection well).
3. Surface facilities up to the transfer of custody, including treatment and storage vessels, gas compressors and associated piping and equipment.
4. Roads constructed solely for the purpose of access to well sites and surface facilities.

This exemption is in effect only when an adequate soil erosion and sedimentation plan is submitted as part of the application for a permit to drill and operate. The determination of the adequacy of the soil erosion and sedimentation plan shall be made on a case-by-case basis as part of the review of applications by staff of the Geological Survey Division (GSD).

Although not required to obtain Part 91 permits, oil and gas operators are required to conform to the other applicable requirements of Part 91. They must implement and maintain control measures to reduce accelerated soil erosion and sedimentation. Soil erosion and sedimentation requirements shall be enforced by GSD staff at well pads and at primary treatment and storage sites (commonly referred to as production facilities). Inspection of flow lines and access roads may continue to be conducted by county or local enforcing agencies. A work group has been initiated to formulate uniform requirements for soil erosion prevention measures to be included in applications for permits to drill and operate under Part 615, and to address the role of county and local enforcing agencies.

Please convey this directive to your staff and to the appropriate parties involved. The Chief of the Geological Survey Division is responsible for notifying oil and gas operators, and the Chief of the Land & Water Management Division is responsible for notifying county and local enforcement agencies.

cc: Chad McIntosh, Deputy Director

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MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

May 17, 1996

SUPERVISOR'S LETTER

Letter No.: 1996-3
Effective Date: May 17, 1996

TO: Geological Survey Division Staff

FROM: Lynne M. Boyd, Acting Chief, Geological Survey Division

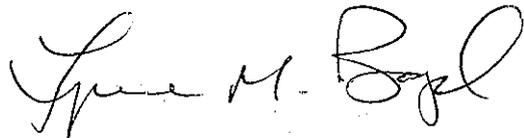
SUBJECT: Loss of Radioactive Logging Sources

A recent incident in which a radioactive logging source was lost and abandoned in a well bore pointed out the need to inform Geological Survey Division staff of notification requirements when such a loss occurs. Staff of the Radiological Protection Section of the newly-formed Drinking Water and Radiological Protection Division (DWRPD) of the Department of Environmental Quality have a responsibility to track such losses and to determine that federal Nuclear Regulatory Commission procedures are properly followed by the industry prior to abandoning a radioactive logging source in a well bore.

The loss of a radioactive logging source should be reported to Mr. Dave Minnaar or Mr. Bob Skowronec of the DWRPD. During normal working hours, they can be reached at 517-335-8204. After hours, Geological Survey Division staff should contact State Police Operations at 517-336-6100. When the contact is made, the following information should be given if available:

- 1) A nuclear logging source has been lost in a well bore;
- 2) The source licensee (i.e. the logging company);
- 3) The type of source;
- 4) The well location;
- 5) The depth at which the source is lost;
- 6) What attempts the source licensee is making, has made, or plans to make to retrieve the source; and
- 7) Geological Survey Division staff contact name and phone number.

Geological Survey Division staff should report the loss of a radioactive source as soon as possible after learning of the loss.



cc: Flint C. Watt, Chief, DWRPD, DEQ
Dave Minnaar, DWRPD, DEQ

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

MAY 28 1996

May 22, 1996

SUPERVISOR'S LETTER

Letter No: 1996-4

Effective Date: May 22, 1996

To: Geological Survey Division Staff

From: Lynne M. Boyd, Acting Chief, Geological Survey Division

Subject: Exceptions to Supervisor of Wells Instruction No. 2-87 (S.I. 2-87)
Drilling of Wells Within Residential Areas Zoned prior to
October 1, 1986

The following memos are rescinded:

- Exceptions to S.I. 2-87 dated November 24, 1987, from R. Thomas Segall; and
- Procedure for Processing Drilling Reserve Pit Exceptions in Areas Zoned "Residential" pursuant to S.I. 2-87 dated November 4, 1992, from R. Thomas Segall to Tom Wellman

S.I. No. 2-87 allows for several exceptions. Effective immediately, these exceptions will be handled as follows:

Pumping Jacks:

When pumps are necessary to produce the well, electrically driven pumps shall be utilized or, if judged impractical by the Supervisor, pumps may be driven by other power sources having hospital-type mufflers or equivalent. The decision of the Supervisor that an electrical pump is impractical and, therefore, other power sources may be used is delegated to the District Supervisors.

Drilling Mud Containment:

Only tanks shall be utilized while drilling (except in-ground pits may be utilized for emergency purposes) unless the applicant/permittee makes a request for an exception as part of the written application for a permit. Approval of exceptions

to use in-ground pits under S.I. 2-87 is delegated to the Field Operations Supervisor.

An exception may be granted if the applicant/permittee satisfactorily demonstrates as part of the Environmental Impact Assessment that:

"a municipal water system from a surface water or a protected groundwater aquifer is used or required. A protected groundwater aquifer means an aquifer which has sufficient isolation distance and/or geological barrier(s) to prevent the migration of pollutants from the drilling mud pit or accidental loss of drilling fluid from the surface."

When a permit application is received by the Permit Coordinator for a residential location subject to S.I. 2-87 which requests an exception due to a protected groundwater aquifer, the request and supporting information will be forwarded to the Staff Specialist of the Geohydrology Team for review. The Staff Specialist will evaluate if the applicant/permittee has satisfactorily demonstrated that the area utilizes a protected groundwater aquifer and provide that evaluation and recommendations to the Field Operations Supervisor. If the data is insufficient to evaluate the protected groundwater aquifer, the request will be returned to the Permit Coordinator. The Permit Coordinator will include the request as part of the permit application deficiency letter.

The District field review will include recommendations relative to the granting of this exception and be transmitted to the Field Operations Supervisor as a controversial site in accordance with Division permitting procedures. Staff may recommend no in-ground pits as part of the normal field review process even if conditions for the exception are fulfilled.

A handwritten signature in black ink, appearing to read "James M. Boyd". The signature is written in a cursive style with a large, looped initial "J".

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MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

May 30, 1996

SUPERVISOR'S LETTER

Supervisor's Letter: 1996-5
Effective Date: May 30, 1996

TO: Unit, District, and Section Supervisor(s), GSD

FROM: Hal Fitch, Acting Division Chief, GSD

SUBJECT: Delegation and Designation of Authority to Approve Uniform Spacing Plans

In addition to the Chief of the Geological Survey Division, the following persons are authorized to approve uniform spacing plans pursuant to Supervisor of Wells Order No. (A) 14-9-95: the Supervisor of the Permits and Bonding Unit and the Supervisor of the Technical Evaluation and Regulatory Support Section.

This replaces R. Thomas Segall's, August 4, 1995, delegation memorandum.

Hal Fitch

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

May 12, 1997

SUPERVISOR'S LETTER

Letter No.: 1997-1
Effective Date: May 12, 1997

TO: Geological Survey Division Field Staff, Geohydrology Team,
Orphan Well Team, and Compliance Unit Staff

FROM: Harold R. Fitch, Chief, Geological Survey Division

SUBJECT: Total Petroleum Hydrocarbon (TPH) and Aesthetic Cleanup Criteria
for Soil at Oil and Gas Facilities

The Supervisor of Wells is providing this Supervisor's Letter to promote consistent application of TPH and aesthetic cleanup criteria to oil and gas facilities that have experienced a release of brine, crude oil, or oil field waste. The following direction will supplement the Division Procedure 4.3 entitled "Spill Response" and rescind the interim procedure described in the memorandum of February 5, 1992, "Use of TPH as a Screening Tool."

JURISDICTION

Section 61505 of Part 615, Supervisor of Wells, of the Natural Resources and Environmental Protection Act, (NREPA), 1994 PA 451, as amended, gives the Supervisor of Wells "jurisdiction and authority over the administration and enforcement of this part and all matters relating to the prevention of waste. . . ." Waste as defined in Part 615 of the NREPA, Section 61501(p)(i)(B), includes "underground waste" which embraces "unreasonable damage to underground fresh or mineral waters, natural brines, or other mineral deposits from operations for the discovery, development, and production and handling of oil or gas." Section 61501(p)(ii)(B), Part 615 of the NREPA, defines "surface waste" as "the unnecessary damage to or destruction of the surface; soils; animal, fish or aquatic life; property; or other environmental values from or by oil and gas operations."

Part 201 Environmental Remediation of the NREPA defines petroleum as a hazardous substance. The Supervisor considers concentrations of oil, gas, and brine components defined as hazardous substances by Part 201 of the NREPA and described in Environmental Response Division's (ERD) Operational Memorandum #8 to be criteria

indicating waste as defined under Part 615 of the NREPA. The Supervisor also considers total petroleum hydrocarbons as diesel range organics (TPHDRO) concentrations above 10,000 mg/kg in soil to be criteria indicating waste as defined under Part 615 of the NREPA.

BACKGROUND

Determining appropriate remediation standards for crude oil has been difficult, due to the enormous variation of compounds present in unrefined petroleum. The practice has been to utilize the analysis for carcinogenic benzene as an indication of crude oil contamination. Although this method quantifies some of the human health risk, this analysis is not suitable to detect the presence of the other compounds present in crude oil which also present human health risk.

A National Total Petroleum Hydrocarbon Criteria Work Group has been assembled. It consists of members of academia, regulatory agencies, industry, and environmental groups. Work performed in connection with this group, specific to the crude oils of Michigan (Dundee, Trenton, Niagaran, Berea and Richfield), has assisted the Supervisor in determining appropriate cleanup standards and analysis parameters.

Finally, an effective remedial action must address aesthetic concerns such as phytotoxicity, leachability to groundwater, and odor problems. If all the contaminant concentrations are at or below the target cleanup criteria, and a demonstration of aesthetic criteria is met, no further remedial action is required.

SPILL CLASSIFICATIONS

Rule 1008, Reporting of losses and spills; of Part 615 of the NREPA defines three spill classifications.

1. **Non-Reportable Spill, Rule 1008(6).** Spills of brine, crude oil, or oil and gas field waste are not considered reportable when: (a) the quantity is less than 42 gallons, (b) the release is observed in progress by on-site personnel, (c) are completely contained, and (d) are cleaned up within one hour. Department staff will likely not be notified of these types of releases.
2. **Low Impact Spill, Rule 1008(4).** Spills are considered low impact when: (a) the quantity is less than 42 gallons, (b) does not impact surface water, groundwater, or other environmentally sensitive areas, (c) is completely contained, and (d) is cleaned up within 48 hours after discovery. These spills are considered reportable using Part I and III of Form EQP 7233. Generally, cleanup of these types of spills can be guided by excavation of odorous or visually stained soils, pursuant to Procedure 4 3, Spill Response.

3. **High Impact Spill, Rule 1008(2), (5) and (7).** GSD staff will be notified within eight hours of discovery of spills considered high impact, which are: (a) when the quantity of brine, crude oil, or oil and gas field waste is 42 gallons or more, (b) any quantity of other chemicals used in association with the oil field, or (c) when the quantity of brine, crude oil, or oil and gas field waste is 42 gallons or less and impacts surface water, groundwater, or other environmentally sensitive areas, or is not completely contained and cleaned up within 48 hours after discovery. Written notification from the operator will follow within 10 days of discovery on Form EQP 7233. These types of spills will require verification sampling to demonstrate cleanup.

ANALYTICAL PARAMETER SELECTION

GSD staff should utilize best professional judgment on a facility specific basis, to determine which parameters are necessary to verify cleanup of soil and groundwater contamination.

Appropriateness of analytical parameters is determined by what is known about the nature of the contamination. Factors to be considered include: (a) whether the loss is crude oil, brine, dehydrator condensate, or a combination, (b) the age of the spill, (c) the history of the Facility, (d) the existence of multiple releases and/or releases from different sources, (e) available analytical data, and (f) other information which may be gathered during the course of formal investigation.

Cleanup parameters should reflect each source area. When the nature of the contamination is unknown, samples may be analyzed for all of the parameters described below in order to determine which are appropriate for verification. The soil sampling strategy should follow the DEQ Guidance Document for Verification of Soil Remediation dated April 1994, or other pre-approved method. Analytical methods and recommended detection levels are described in the current ERD Operational Memorandum #6.

1. Crude Oil

When crude oil is lost, analytical parameters should include TPHDRO and benzene, toluene, ethylbenzene and xylene (BTEX). When crude oil is encountered as a free, non-aqueous phase liquid, benzene may be present at high concentrations. A recent crude oil spill can be characterized using BTEX as the analytical parameter. For an old or weathered spill, analytical data for the Facility may document that BTEX is no longer present. In this case, BTEX analysis would not be necessary to document verification of remediation of the Facility. However, TPHDRO and aesthetic concerns must be addressed.

2. **Dehydrator Condensate or Hydrocarbon Condensate**

In the instance of a loss of dehydrator or hydrocarbon condensate, BTEX should be the only parameter necessary to verify cleanup.

3. **Brine**

When the loss involves brine, chloride should be included as well as the appropriate hydrocarbon cleanup parameters.

Material Released	Parameter
Fresh Crude Oil Hydrocarbon Condensate Dehydrate Condensate	BTEX
Weathered Crude Oil (demonstrate BTEX is no longer present)	TPHDRO
Brine	Chloride

SOIL CLEANUP VERIFICATION METHODOLOGY

Cleanup verification is based in part on the method used to perform a remedial action at a Facility:

- a. When the release at a Facility has been characterized by soil borings and monitoring wells, the horizontal and vertical extent of contamination is fully defined. Implementation of a cleanup occurs within areas demonstrated to be affected by contamination, and verification sampling supplements data already obtained during site characterization.
- b. When a Facility has not been characterized by formal investigation and cleanup is guided by excavation of odorous or visually contaminated soils, the demonstration must be made that all areas above target cleanup criteria have been removed. Field screening methods may be used to show a declining trend in contaminants and determine where final verification samples are collected. Verification sampling must show that soils at the excavation walls and floor meet target cleanup criteria.

A methodology has been formulated and a flow chart entitled "Soil Cleanup Verification Methodology" has been constructed to assist with the soil verification strategy rationale (attached for your reference)

After the selected remedial action has been performed, the affected soil is sampled and analyzed for appropriate parameters. The analytical results are then compared to the applicable criteria listed in the most recent ERD Operational Memorandum #8, and, if appropriate, the Supervisor's health risk-based TPHDRO criteria of 10,000 mg/kg. If some or all of the sample results do not meet the criteria, additional remediation may be performed, or further testing may demonstrate the degree of cleanup attained is protective of the groundwater.

1. Demonstration of Groundwater Protection

To document whether concentrations of BTEX, TPHDRO, or Chloride present a threat to groundwater, a leachability test should be performed. The soil sample is leached by the method listed below and the leachate obtained is analyzed for BTEX and/or Chloride, as appropriate. For crude oil waste, it has been demonstrated that concentrations of contaminants which have been shown to be protective of the groundwater will also be protective of direct human contact.

- a. To demonstrate BTEX leachability, EPA Method 1311, Toxic Characteristic Leaching Procedure (TCLP); or EPA Method 1312, Synthetic Precipitate Leaching Procedure (SPLP), Extraction Fluid #3 should be used. The leaching procedure results should be compared to residential groundwater criteria for BTEX. If BTEX leaches above the groundwater criteria, additional remediation of soil is required.
- b. To demonstrate Chloride leachability, EPA Method 1311, Toxic Characteristic Leaching Procedure (TCLP); or EPA Method 1312, Synthetic Precipitate Leaching Procedure (SPLP), Neutral Extraction Fluid; or ASTM D3987-85 (ASTM Neutral Leach) should be used. If chloride leaches above the groundwater criteria, additional remediation of soil is required.

2. Demonstration of Aesthetics and Soil Use/Phytotoxicity Protection

For crude oil cleanups, if the concentrations of contaminants are at or below target cleanup criteria as listed in ERD Operational Memorandum #8, and the health risk-based TPHDRO criteria is met, further testing may be required to demonstrate that aesthetic issues are adequately addressed. The following criteria should be applied and the soils evaluated as appropriate.

- a. Depth of the affected soil is at or below 15 feet. The soils are below crop depth and located below residential foundations such that odors should not present a problem in basements. No further remediation or testing is required.
- b. Depth of contamination is less than 15 feet. Odor and vapors in basements, visually stained soils and soil use/phytotoxicity are still of concern and the following demonstration must be performed.

May 12, 1997

- (i) If the soil contamination is between ground surface and 5 feet deep, or an ex situ method of remediation is being verified, the demonstration must be made that seeds will germinate and the soil will sustain vegetation consistent in type and density with the surrounding area for one growing season. If soil amendments are utilized, they must be approved prior to the application.

- (ii) For soil contamination between 5 and 15 feet deep, a grab sample representative of the soils should be obtained to evaluate odor and visual effects from petroleum.

More sophisticated cleanup evaluations or determinations of environmental protection may be performed if necessary. These could include, but are not limited to, comprehensive fate and transport modeling, site-specific risk based calculated clean-up criteria, or land use restrictions.

Staff should contact the appropriate Geohydrology Team hydrogeologist with questions on sample parameters procedures, or for assistance in evaluating verification methodology.

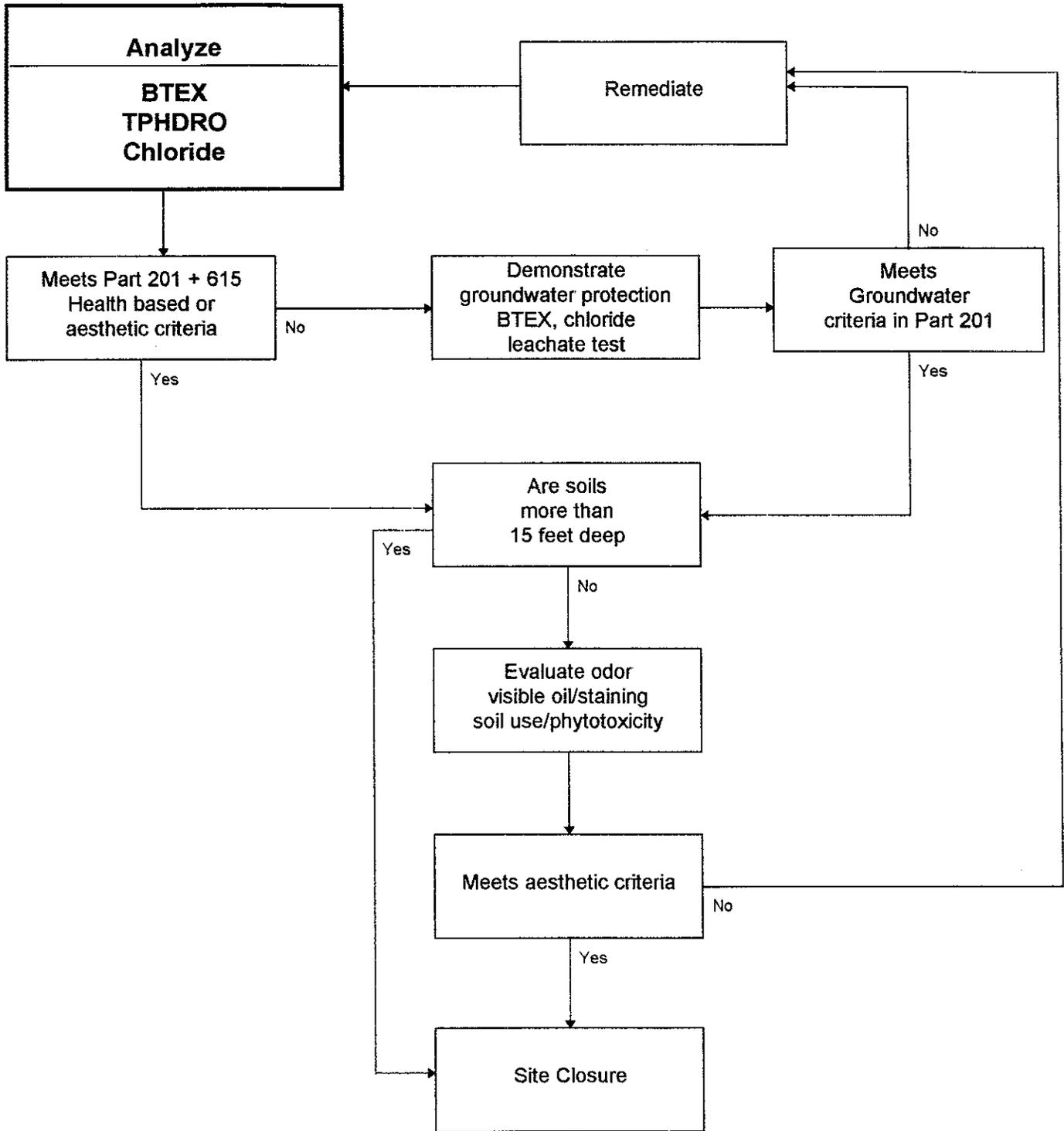


Attachment

cc: Rodger Whitener

SOIL CLEANUP VERIFICATION METHODOLOGY

Attachment, Supervisor's Letter 1997-1



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

May 19, 1998

SUPERVISOR'S LETTER

Letter No.: 1998-1

Effective Date: May 19, 1998

TO: Geological Survey Division Staff of the Field Operations Section
Compliance Unit and Orphan Well Team

FROM: Harold R. Fitch, Chief, Geological Survey Division

SUBJECT: Collection and Analysis of Volatile Organic Compounds in Soil
Method 5035 - Methanol Preservation of VOC samples

BACKGROUND

The Michigan Department of Environmental Quality (MDEQ) has determined that Method 5035 for collection and preservation of soil samples for analysis of volatile organic compounds results in more accurate analysis by preventing loss of volatiles prior to analysis. Analyses under Method 5030 have been shown in some cases to be 1 to 3 orders of magnitude less than analyses utilizing Method 5035.

Environmental Response Division, Waste Management Division and Storage Tank Division of the MDEQ will by June 1, 1998, adopt Method 5035 for collection and analysis of volatile organic compounds in soils as it more accurately represents contaminants at the site by reducing loss of volatiles during collection and transport.

Supervisor's Letter 1997-1 dated May 12, 1997, entitled Total Petroleum Hydrocarbon (TPH) and Aesthetic Cleanup Criteria for Soil at Oil and Gas Facilities and GSD Division Procedure 4.3 identifies when we will require analysis for the volatile organic compounds benzene, ethylbenzene, toluene, and xylene (BETX) at sites of environmental contamination regulated by Geological Survey Division.

R 324.407(7)(e) of Part 615, Supervisor of Wells of the Natural Resources and Environmental Protection Act, 1994 PA 451, (NREPA) requires:

"A permittee of a well shall, before encapsulation, test the fluids and cuttings remaining in the pit to determine the concentrations of benzene, ethylbenzene, toluene, and xylene and provide

certification to the supervisor or authorized representative of the supervisor of the test results, except that a permittee is not required to test the fluids and cuttings remaining in the pit for benzene, ethylbenzene, toluene, and xylene if the well was drilled with water from a source approved by the supervisor and if, during the drilling operation, liquid hydrocarbons were not encountered."

POLICY

Staff of the Geological Survey Division will utilize and require the regulated community to utilize sampling and analytical techniques consistent with EPA Method 5035 as modified by Environmental Response Division (ERD) for the verification of soil remediation as follows:

- Method 5035 will be used immediately for sampling and analysis at all state funded cleanup activities including 201 bond, orphan well, and forfeited bond sites.
- Method 5035 will be required as of June 1, 1998, and is encouraged for immediate use, to verify soil remediation at all cleanups under the regulatory authority of Geological Survey Division.
- Method 5035 will be required after June 1, 1998, for analyses of pit cuttings pursuant to R 324.407(7)(e) of Part 615 of the NREPA.

EXCEPTIONS

- Geological Survey Division hydrogeologists, upon demonstration that the results are expected to be consistent with Method 5035, may approve alternatives, such as onsite labs.
- Sites which are subject to an approved consent order or remedial action plan may utilize methods identified in the order or plan, however, we recommend that they be modified to utilize Method 5035.
- Facilities/sites that have already been closed or partially closed will not have to re-test using Method 5035 unless the MDEQ determines that existing concentrations in the soils are causing an identifiable impact on receptors.

Attachments:

- Supervisor's Letter 1997-1
- Frequently Asked Questions regarding Methanol Preservation of soil samples contaminated with volatile organic chemicals
- ERD Guidance Memo dated 3/31/98 - Method 5035 Field Sampling Procedure

cc: Rodger Whitener, MDEQ
Tom Godbold, MDEQ



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

REVISED March 31, 1998

TO: All Environmental Response Division (ERD) Staff

FROM: Dan Schultz, Field Operations, ERD, MDEQ

SUBJECT: Environmental Response Division Guidance Memo
New VOC Sediment Sampling Method 5035
ERD Field Sampling Procedure

This is the latest update on the methanol preservation field procedure. As new revisions are made, they will be forwarded to all interested internal staff through your district supervisor.

The following is the ERD soil/sediment sampling procedure to be used for EPA SW-846, Method 5035, MDEQ Method 8260 Soil VOA.

The plastic syringes, 2 oz. & 4 oz. jars, methanol ampules and green CH₃OH labels will be obtained from the Filley Street facility. Field staff will be responsible for placing and picking up orders following the same procedure they presently use for other sample supplies. The jars are prelabelled and the "weight" written in methanol semi-resistant ink on the label. Please do not add any other labels (exception is the green hazardous label for the methanol/soil sample jar), tape, etc. Please make sure you remove excess soil from the exterior of the jar and lid threads, otherwise, you will affect the weight and seal of the jar. The lab MUST receive the sample within four days of collection. Total holding time for the sample is 14 days.

This procedure is intended to prevent biodegradation and to diminish the volatilization of a contaminant, so the fewer disturbances to the soil matrix and the less time between removal of the sample from the ground to its placement in methanol, the more accurate the analytical results will be. Therefore, the sample should be prepared and the procedure followed as quickly as safety allows.

EQUIPMENT REQUIREMENTS

- | | |
|--|---------------------------|
| -Methanol 25 ml Ampules | -Green Methanol Stickers |
| -2 oz Glass Sample Bottles | -Plastic 20 ml Syringes |
| -4 oz Glass Sample Bottles | -Sharp Cutting Tool |
| -Pliers/Other Glass Ampule Breaking Tool | -Scale |
| -Safety Goggles | -20 Gram Weight |
| -Gloves | -Decontamination Material |
| -Hard-hat | -Steel Toed Boots |
| -Plastic Waste Container | -Zip Lock Plastic Bags |

I. FIELD PROCEDURE

(after you have collected the soil/sediment sample)

- 1.) Wear your safety goggles and appropriate gloves
- 2.) Take the syringe and cut the tip off at the zero cc mark. The cutting motion should be in a direction away from your body. You can cut the tip off the syringe prior to going to the field, however precautions must be taken to prevent any contamination of the interior/exterior of the syringe. A small pocketknife with a sharp blade can be used. Be as precise as possible.

The cutting tool should be decontaminated before and after cutting the syringe. Follow all the standard decontamination procedures as you have in the past. If there is a rubber stopper on the syringe plunger, you will need to remove the rubber stopper. However, these should already be removed by the manufacturer.

The manufacturer has assured us these syringes are sterile (medical purposes) so you should not need to decontaminate the syringe prior to use.

- 3.) Decontaminate the field scale and calibrate it with the 20 gram weight provided. Use the scale and weigh the empty syringe. Write the weight of the empty syringe in your field notebook. If you do not have a 20 gram weight for calibration, you can use an American nickel. This weighs exactly five grams. Even though a 5 gram nickel may not provide exact calibration for the soil sample, you should still be able to calibrate your scale with 5 grams and be within the 3 gram +/- tolerance range for the 25 grams soil/sediment sample.
- 4.) Take the split spoon sample, hand auger sample or whatever you are using to collect your soil sample and insert the open end of the syringe into a fresh face of undisturbed soil (if possible).
- 5.) Push the syringe into the soil and fill it as full as possible.
- 6.) Take your index finger, thumb, or other instrument and push the soil deeper into the syringe. Attempt to obtain an area at the opening of the syringe clear of soil. This will assist you in minimizing the amount of contaminants that will adhere to the scale clip.
- 7.) Recalibrate the scale with the 20 gram weight provided.

- 8.) Weigh the soil filled syringe with the field scale and write the weight in your field notebook.
- 9.) Subtract the weight of syringe from the total weight of syringe and soil (soil must weigh 25 grams + or - 3 grams tolerance for a 22 to 28 gram range, **WITHOUT** the weight of the syringe). If you do not have 25 grams of soil, you **MUST** repeat steps 4 through 6 until you have a total of 25 grams of soil. For most soils, approximately the same volume of soil will yield approximately the same weight of soil. If you have too much soil, you must discharge soil from the syringe until you fall within the 22 to 28 grams range.
- 10.) Write the soil weight in your field notebook. You do not need to provide the weight of the sample to the lab, the lab will reweigh the sample upon receipt.
- 11.) Remove the cap from the 2 oz. jar.
- 12.) Insert the open end of the syringe into the jar, push the plunger and discharge soil.
- 13.) Immediately take the methanol ampule and open it by breaking the plastic cap off. If you use the provided specialized pliers, take the ampule in one hand and the specialized pliers in the other. Place the ampule's plastic cap in the serrated hole between the two pliers' jaws. Keep the pliers as close to the area where the plastic cap meets the full glass ampule. While holding the ampule in one hand and the pliers in the other, gently squeeze the pliers' handles together until the plastic cap snaps off.

You can also open the ampule by using an empty syringe. Take the empty soil sample syringe and place the open end of the syringe over and down on the ampule's plastic cap as far as it will go without pressure. Hold the ampule with one hand and take the empty syringe in the other. Gently press the syringe away from you, while firmly holding the glass ampule on a flat surface, until the cap gently snaps off. Do not apply any pressure either toward or away from you on the glass ampule. Let the pressure you are exerting against the syringe remove the plastic cap.

If you choose to snap the plastic cap off by hand, please be cautious with the glass edges on the broken ampule.

At all times you must be wearing your safety goggles.

- 14.) Pour the methanol into the 2 oz. jar over the soil*. If any methanol is spilled outside of the jar, you MUST discard the sample and take another. Otherwise, you will have a high false positive number. The lab will not knowingly accept the sample.
- 15.) Place cap TIGHTLY on the 2 oz. jar and gently shake it for 10 seconds.
- 16.) Attach a provided green CH₃OH methanol label to the top of the lid.
- 17.) Place the prepared soil sample in an upright position on ice in a cooler (It is recommended that each sample jar be placed in a plastic zip lock bag in case of leakage).**
- 18.) Dispose of the syringe in a plastic waste container.
- 19.) Select an unweighed 4 oz. jar and fill it completely with the same soil as the VOC sample. This sample is for dry weight/total solids analysis*** and must be labeled by staff collecting sample. You do not need a syringe for this sample. It is very important that the dry weight soil sample come from the same soil type as the methanol sample, i.e. sand to sand/clay to clay, etc.
- 20.) Decontaminate the clip on your scale using standard decontamination procedures. Dispose of all waste materials appropriately.

II. TRIP BLANK

- 1.) Pour methanol from an ampule into an empty 2 oz. jar at the beginning of the sampling event. This is a check on cross contamination of methanol preserved samples.
- 2.) Place the green CH₃OH methanol label on the top of the lid.
- 3.) The pure methanol sample (trip blank) must accompany each batch of samples (each cooler) for each site and each day that samples are collected.

* You can opt to place the methanol into the 2 oz. jar prior to the soil. There is the possibility of splash, so take precautions when emptying soil into the methanol. All other steps of the soil sampling procedure remain the same. A change in 1 ml of MeOH will cause a 4% change in the final results.

** Please note, any sample collected by following this procedure that is not sent to a lab, is considered hazardous waste and must be disposed of properly.

***The amount of moisture will affect your sample results. The higher the moisture content, the higher the detection limit will be.

NOTE: Sediment/high moisture content samples are collected the same as soil samples by following this protocol. You will want to exhibit caution in weighing the sample to prevent spillage of the sample.

NOTE: Labs may use a variety of tracking mechanisms for vial weights (taring), so only use the vials supplied by the lab performing the analysis.

NOTE: If you are collecting samples under a court order, i.e. warrant, it is recommended you take two methanol samples in case of leakage/breakage/incorrect weight <22 or >28 grams.

CAUTION: Methanol is a poison, please handle appropriately. If ingested, contact a physician immediately.

Frequently Asked Questions

DRAFT
revision 2
April 22, 1998

Methanol Preservation of Soil Samples Contaminated With Volatile Organic Chemicals

General

1.) **Question:** *What is wrong with the old method? Why are we doing this?*

Answer: The Method 5030 did not prevent volatilization and biodegradation of volatile organic contaminants in soil samples. Loss of contaminant concentration in soil samples between collection and lab analysis have been documented to be between 1 and 3 orders of magnitude. Analytical data generated from the method was often misleading and caused inappropriate, ineffective and unprotective remedial decisions to be made on some sites.

2.) **Question:** *Is there sufficient statistical evidence to warrant switching to this method?*

A) *Is there statistical data showing that the samples that we have taken and results we have received in the past, are not statistically reflective of conditions in the field and inadequately reflect the real risk to the human health, safety, and welfare, and the environment (i.e., good decisions were not made about closure of sites).*

B) *Is there statistical data showing that the increased cost (20%) of this method is justified by the number of species that will be saved that would otherwise have died had we continued the use of the old method?*

Answer: A) There is a great deal of research that has been done to document that old Method 5030 lost between 1 and 3 orders of magnitude of contaminant concentration between the time of sample collection and final analysis in the lab. EPA's RCRA and UST programs have switched to the new method. Several state environmental programs have switched to the new protocols and the American Society for Testing and Materials (ASTM) standards for soil sampling for VOCs no longer list methods consistent with old Method 5030 as appropriate and now list methods consistent with Method 5035. For more information consult EPA publication, Soil Sampling And Analysis For Volatile Organic Compounds, U. S. EPA Office of Research and Development, Office of Solid Waste and Emergency Response, Feb. 1991 by T.E. Lewis, A.B. Crockett, R.L. Siegrist, and K. Zarrabi.

B) The additional costs are not expected to be 20% higher than sampling using old Method 5030. Other states such as New Jersey and Wisconsin have found that closed sites have had to be reopened because remedies were ineffective as

a direct result of decisions based upon the inaccurate data provided by old Method 5030.

3.) Question: *Can I get a list of labs that can do the 5035 method?*

Answer: MDEQ does not have such a list. Individual labs will have to be contacted to determine if they are prepared to do the procedure. Additionally, the Michigan Environmental Laboratory Association can be contacted for information on numerous labs within the State of Michigan.

4.) Question: *What is the implementation date for PRPs?*

Answer: The implementation date is different for various regulatory programs administered by MDEQ. Each Division should be contacted for more specific information. In general, however, for Environmental Response Division programs it is recommended that all new sampling be done from this point forward using Method 5035 protocols. Remedial Action Plans based upon sampling using old Method 5030 after the availability of the significantly more reliable new method may not be approved by the Division.

Geological Survey Division also recommends use of Method 5035 from April 1998 forward for sites regulated under their programs.

Underground Storage Tank Division will implement use of the Method 5035 on June 1, 1998.

Waste Management Division is implementing use of Method 5035 for all Michigan Hazardous Waste Treatment, Storage, or Disposal Facilities on April 30, 1998.

Acceptable Methods

1.) Question: *Do PRPs and consultants have to use MDEQ's method of soil sampling and lab analysis?*

Answer: MDEQ's method is it's implementation of EPA Method 5035. The implementation reflects organizational specific field structure, lab protocols and equipment availability. Organizations, labs and consultants are free to use any protocols that are consistent with Method 5035. They only need document their procedures so as to be able to document data adequacy and accuracy.

2.) Question: *Method 5035 lists use of Encore Samplers™. Will MDEQ accept use of these samplers rather than methanol preservation?*

Answer: Use of the Encore Sampler™ in accordance with Method 5035 is an acceptable alternative to methanol preservation of samples.

3.) Question: *Method 5035 lists a low level method of soil sampling/preservation using sodium bisulfate. Why did MDEQ not chose to use this method of sample preservation?*

Answer: For several reasons MDEQ did not choose to use the low level method outlined in Method 5035 even though it can give better detection limits. First, the method does not work in all soil types. In calcareous soils, sodium bisulfate has a chemical reaction with the soil that impacts the results of the analysis. Secondly, the low level method requires special equipment that labs would have to purchase in order to run the method correctly. Additionally, with the low level method, soil samples would have to be weighed to within 0.1 gram in the field. This was thought to be extremely difficult under field conditions.

Lastly, MDEQ was able to achieve method detection limits (MDLs) below the most restrictive criteria using methanol preservation for all contaminants of concern except vinyl chloride. MDEQ determined that for vinyl chloride, the Target Method Detection Limit (TMDL) or Practical Quantitation Limit (PQL) would be the default value until better lab techniques could lower the TMDL (PQL) to below the most restrictive criteria.

4.) Question: *Why did MDEQ choose not to use the Encore Sampler™ for routine sampling?*

Answer: MDEQ recognizes that the Encore Sampler™ is an effective method of sampling for VOCs. However, for BETX contaminants experiments showed that the holding time was only 48 hours. For that reason EPA Method 5035 allows only a 48 hour holding time for Encore samples. The Encore collected sample must then be analyzed using either Method 5035 low level or high level analysis. For many situations under which sampling is done, the holding time was considered too short for general application in the program.

5.) Question: *Will Michigan require the low level sodium bisulfate preservation sampling and analysis method?*

Answer: MDEQ does not anticipate utilizing the low-level method in our laboratory until the low-level method or low-level lab equipment is perfected for routine production analysis. The main compound affected by this decision is vinyl chloride. Vinyl Chloride is the only compound for which the detection limit

will be above an applicable Part 201 cleanup criteria. Vinyl Chloride has a soil protection of indoor air criteria of 28 ppb. This is below the detection limits for Method 5035, methanol preservation. In this case the criteria will default to the method detection limit.

MDEQ will accept results obtained from use of Method 5035, sodium bisulfate preservation or the Encore Sampler TM method of preservation.

6.) Question: *How will this affect use of field GC methodology? Can we continue to use it? If we use both, does staff need guidelines addressing when to use which method?*

Answer: GC methodology can still be used as before. It provides an acceptable estimate of VOC levels for screening and administrative cases only.

Laboratory Specific

1.) Question: *By what date will laboratories be required to utilize the new approach?*

Answer: There is no date by which laboratories will be required to utilize the method. However, consultants and PPPs generating data for MDEQ programs will need to use the newly promulgated EPA Method 5035 as required by the specific programs they are working under. Thus, it is anticipated that the advantages of the method as well as competitive factors among various laboratories, will drive the implementation of the new method.

2.) Question: *It is reported that the longer a soil is in contact with methanol the greater the amount of contaminant is extracted from the soil. This would result in inconsistent analysis results for the same sample or duplicate samples.*

Answer: Desorption of Volatile Organic Contaminants into methanol from organic matter in a soil is a chemical process that occurs over time. MDEQ is aware of this process and therefore has included 20 minutes of sonication of the sample in the analytical method to increase the contact and mixing of the methanol with the soil matrix. Variability in analytical results caused by different contact times is reduced by the sonication step.

3.) Question: *What are the MDEQ laboratory detection limits?*

Answer: MDEQ detection limits for individual compounds can be found in Environmental Response Division Operational Memo # 6

4.) Question: *If a sample is preserved with methanol, a Synthetic Precipitate Leaching Procedure analysis cannot be performed. The SPLP method has been used by PRPs to show that remediation is sufficient at a site, even though the*

actual concentration of BTEX or other contaminants in the soil are above the Generic Residential Soil Criteria (Valiquett delist is one example). How should we handle this now?

Answer: It is correct that a Synthetic Precipitate Leaching Procedure can not be performed on methanol preserved samples. Until a practical method of SPLP sampling is developed that stops volatilization and biodegradation, the present practice of analyzing unpreserved bulk samples will be continued. The results of such tests are believed to be significantly biased low.

5.) Question: *Will the syringes leach anything and contaminate the sample?*

Answer: The MDEQ lab has tested the syringes and has found no contamination in them.

Field Procedures

1.) Question: *During some field investigations consultants or regulators take numerous samples from each location. After screening the samples on site they chose the most impacted samples for analysis at a lab. If they preserve each of these samples in methanol they will have to deal with the disposal of numerous methanol contaminated samples.*

Answer: Proper disposal of potentially contaminated samples and sampling equipment is already required in site investigations.

2.) Question: *MDEQ's field method states that if methanol is spilled, the sample is not usable. There will always be a drop or two of methanol left in the ampule. Is the sample invalid?*

Answer: Although it is best to get all 25 ml of methanol into the sample jar, a loss of a few drops will not greatly bias the results. A 1 ml loss of methanol, which is much greater than the amount that could conceivably stay in the ampule, would only bias the analytic result by 4 %.

3.) Question: *How do I dispose of wasted methanol samples.*

Answer: For MDEQ staff, the MDEQ lab will dispose of a small number of wasted methanol samples. Otherwise standard practices for disposing of wasted contaminated samples and supplies should be followed.

4.) Question: *Do we need to document which lot of methanol was used for samples due to quality variations in lots?*

Answer: It is best if the same lot of methanol can be used for all samples in a sampling run. A blank must be analyzed for each lot that is used on a site to

document the purity of the lot. Methanol from one ampule must be poured into a 2 ounce jar and analyzed. If more than one lot is used then separate blanks must be run for each lot.

5.) Question: *What if I do not have enough soil for the dry weight? Is there a minimum amount for dry weight? If so how much?*

Answer: If possible provide a full 4 oz or 2 oz jar of soil for dry weight measurement. However, the minimum required by the MDEQ lab for dry weight analysis is 25 grams of soil.

6.) Question: *Will more soil volume be required for complete sample sets (sample, low level, dry weight)? If enough soil is not available from the borehole, additional holes must be drilled. What is the failure/invalidation rate of samples for this method (if too many samples are lost, remobilization may not be feasible)?*

Answer: Normally less soil sample volume is required for a methanol preserved sample. Method 5030, which this method replaces, called for a fully packed 4 oz. of sample. For most sampling with methanol preservation, 25 grams of soil is required for preservation and 2 oz. of sample is requested for dry weight analysis. (The MDEQ lab can use a minimum of 25 grams of unpreserved sample for dry weight analysis). Thus, the total soil required by the lab is less than the old method of sampling.

There will likely be some failure rate due to leakage of jars and inaccurate weighing of the samples in the field. Wisconsin DNR saw significant failure of field staff to properly weigh the sample in the field. This problem persisted for only a short duration because consultants quickly realized the cost to a project of not performing the method correctly the first time.

MDEQ experienced significant failures of the method due to a shipment of defective jars. MDEQ went back to the manufacturer and the problem was resolved. It should be noted from the MDEQ's experience that, had methanol not been in the jars and leaked, the defects of the jars would have not been detected. Staff using the jars for old Method 5030 sampling would never have detected loss of contaminant from the jars due to volatilization and the defect would never have been corrected by the manufacturer.

7.) Question: *The MDEQ plans to use plastic syringe barrels to core/sample soils. How will hard, rocky, or other resistive materials be sampled? Doesn't fragmenting the matrix to gather a sample defeat the purpose of the new method by encouraging volatilization?*

Answer: In hard or rocky materials MDEQ recommends that either a hardened sampler be used (we have experimented with a steel syringe of our own design) or simply cut pieces of the resistant material into chunks and weigh out 25 grams of the material. The reason this is acceptable is that in resistant materials the soil matrix is not easily broken apart. The small amount of surface area (relative to the interstitial void space) created by breaking the material into chunks is

considered insignificant. Sample results will be biased somewhat lower than the actual level of contamination in the soil but it is expected to be a very minor bias.

8.) Question: *Will soils high in clay and silt disperse evenly in the methanol? If such samples must be crushed it would defeat the purpose of the steps taken to prevent volatilization losses. Would biological losses occur in the portion of the sample that remains whole?*

Answer: Methanol dewateres clays and their structure collapses when immersed in methanol. Shaking the sample for a few seconds will ensure that the entire sample is in contact with the methanol at which point all biological action will cease

9.) Question: *The EPA portrayed one of the benefits of this method being an extended analysis time. Why must MDEQ staff still have the samples submitted to the lab within a 4-day time frame, so that the analysis occurs within 14 days?*

Answer: There have been studies done that have proven that the holding time can be extended to 21 days, but at the present time EPA has not extended the time for analysis. Labs, therefore, need time to complete the analysis on the sample within the 14 day hold time.

10.) Question: *How do I weigh 25 grams of soil in the field?*

Answer: Generally, a scale will be needed in the field to measure to within + or - 3 grams of 25 grams. The soil will be reweighed at the laboratory and analytical result calculations adjusted to account for any variance from requirements for 25 grams of soil and the 1:1 dilution ratio of methanol to soil.

The choice of scale is left to the best professional judgment of those performing the work but should be accurate to within 0.5 grams. Also, it should be noted that the 25 grams, + or - 3 grams, is an MDEQ internal method. Others outside the State could choose other volumes and ranges of weight that their field staff were required to achieve in the field.

11.) Question: *Can this method of field sampling be done when field conditions are less than favorable, i.e.; windy, cold, in a soil pit, in level B gear or higher?*

Answer: Yes, as in all sampling during diverse climatic conditions, adjustments may be necessary. The biggest difficulty using this method will be weighing the sample on a windy day. Weighing the sample during windy conditions requires finding a location out of the wind (for example: the lee side of a drill rig).

The other issue is safety under unfavorable conditions. Although no weather conditions are perceived to pose a higher threat of accident because of the use

of this sampling technique, health and safety considerations should be the overriding concern during any sampling event. Professional judgment should be used to determine when a sampling event should be canceled.

Different levels of protective gear should not be a factor in the use of this method. However, in highly dangerous environments, staff should be extra cautious to ensure that in breaking the glass ampules, they do not cut their gloves on the broken glass.

12.) Question: *What if there is not enough sample material available for 25 grams? Sometimes there is not enough sample in a splitspoon to sample where it needs to be taken; i.e., at a lithology change.*

Answer: Twenty five grams is a very small amount of soil. In the extreme case where 25 grams of soil for preservation and at least 25 grams of soil for dry weight analysis could not be obtained, as little as 10 grams of soil could be collected for preservation and 25 grams for dry weight analysis. However, only 10 milliliters of methanol could be added to the sample in the field (there should be approximately a 1:1 dilution). This would likely be difficult to do in the field unless it was planned for in advance and approval was obtained from the lab doing the analysis.

It should be noted that generally methanol preserved sampling requires less soil than the old Method 5030 used.

13.) Question: *Are any changes required for shipping and handling of collected samples: manifesting, storage, transportation, and disposal?*

Answer: The methanol preserved sample should be shipped and handled in the same manner as groundwater samples that are preserved at < pH 2 or > pH 12 or as heavily contaminated soil samples are now handled. Due to methanol's flammability, there are normally some DOT requirements that would be followed. However, if there is no more than 30 mls of MeOH in each sample jar, have less than 500 mls in total for the shipped package, and the final package does not weigh more than 64 lbs, then it qualifies for shipment as a Small Quantity Exception following 40 CFR 173.4. Refer to 40 CFR 173.4 for further instructions on packaging and labeling requirements.

Field Procedures Specific to MDEQ

1.) Question: *Where do MDEQ staff get the jars, syringes and methanol?*

Answer: MDEQ staff will pick up the jars, syringes and methanol ampules at the Filley Street shop.

2.) Question: *What is the expiration date of the methanol ampule?*

Answer: There is no expiration date for the methanol ampules. Part of the reason for the use of the ampules is the protection against contamination or leakage.

3.) Question: *Are there other scales MDEQ staff can use other than those provided?*

Answer: Yes, but the scale must have the capacity to weigh up to 60 grams and readability of 0.5-gram increments. Special consideration should be given to the ability to decontaminate whatever scale is selected.

4.) Question: *The current suggestion is to use plastic bags to separate the samples to isolate individual sample jar failure. Plastic bags are very porous materials. Does methanol move through the baggies?*

Answer: MDEQ has not experienced methanol leaking from baggies. However, should methanol leak from a jar it smears the ink on the jar. If methanol moves from one baggy to another, jars in the affected bags will have smeared ink on them. Each sample in such jars would be rejected at the lab and would not be analyzed.

Project Implications

1.) Question: *Will MDEQ reopen sites that have been closed using the old method of soil sampling?*

Answer: MDEQ in general will not reopen closed sites unless there is evidence of a serious risk to human health or the environment. This risk would have to be demonstrated.

2.) Question: *What about sites that have an existing Baseline Environmental Assessment (BEA) based upon the old sampling method? Are they afforded protection if subsequent sampling demonstrates higher levels of VOC contamination than documented in the BEA?*

Answer: In order for the Department to negate the protections of a BEA, a prima facie case must be put forth. Higher level contamination apart from other evidence would not in and of itself, constitute a prima facie case.

3.) Question: *On what projects will Method 5035 be required? A site used long ago is being voluntarily tested. The GW is not impacted as shown by testing. Current method soil VOC results show an area of contamination. Will the site have to be retested with Method 5035? Will the new method be required if we want to close the site? Will Method 5035 be required to approve a RAP?*

Answer: For all new sampling on all sites, Method 5035 is recommended for use. Use of other methods is allowed but there would need to be a demonstration that the method gave equivalent results to Method 5035. If there

is concern that there is a significant risk to potential receptors and that risk is demonstrable, then a site should be retested using Method 5035 prior to RAP submittal.

Cost Issues

1.) Question: *What is the estimate of relative sampling cost and time between Method 5035 and Method 5030? An earlier estimate was that it would be 20% more for cost and time.*

Answer: No cost comparison has been made using the exact field procedures that are being proposed. Previous field trial work using methanol preservation of soil samples, resulted in time savings over use of Method 5030. There was no appreciable difference in analytical costs as methanol extraction is already routinely used by laboratories for highly contaminated samples. MDEQ lab has indicated that if there is an increase in analytical cost, it would be on the order of \$6 to \$10 per sample.

There will be a slight increase in the time it takes to sample with methanol if the MDEQ procedure is used as compared to earlier field trial sampling events using methanol preservation. This is due to the fact that field staff is required to obtain greater precision in the sample weight (+/- 3 grams with a goal of +/- 0.5 grams) than was required in previous sampling efforts. With practice, the time required to weigh the sample in the field should be appreciably reduced.

The belief that methanol preservation of samples is much more costly or time consuming, possibly stems from the fact that some programs use field screening methods to characterize sites. Although these methods are effective for screening and even rough site characterization, where high data quality documentation is required, Method 5035 (methanol preservation) replaces Method 5030. Cost savings, for instance, using an on-site GC would be substantial compared to sending the same number of samples to a fixed lab. Adaptation of the methanol preservation method to on-site field analysis has not been examined at this time.

Field Safety Issues

1.) Question: *What is methanol NOT compatible with?*

Answer: Methanol can react violently with strong oxidizing agents such as chromium trioxide, with strong mineral acids such as perchloric, sulfuric, and nitric acids, and with highly reactive metals such as potassium. Sodium and magnesium metal react vigorously with methanol.--

<http://www.qrc.com/hhmi/science/labsafe/lcsstxt/lcsstx58.htm>

2.) Question: *What are the health and safety requirements when using methanol?*

Answer: Physical Properties: Colorless liquid, bp 65 °C, mp -98 °C, miscible with water in all proportions, Odor-Faint alcohol odor detectable at 4 to 6000 ppm (mean = 160 ppm), Vapor Density 1.1 (air = 1.0), Vapor Pressure 96 mmHg at 20 °C, Flash Point 11 °C, Autoignition Temperature 385 °C. Toxicity Data: LD50 oral (rat) 5628 mg/kg, LD50 skin (rabbit) 15,840 mg/kg, LC50 inhal (rat) >145,000 ppm (1 h), PEL (OSHA) 200 ppm (260 mg/m³), TLV-TWA (ACGIH) 200 ppm (260 mg/m³)--skin, STEL (ACGIH) 250 ppm (328 mg/m).

Toxicity: The acute toxicity of methanol by ingestion, inhalation, and skin contact is low. Ingestion of methanol or inhalation of high concentrations can produce headache, drowsiness, blurred vision, nausea, vomiting, blindness, and death. In humans, 60 to 250 ml is reported to be a lethal dose. Prolonged or repeated skin contact can cause irritation and inflammation; methanol can be absorbed through the skin in toxic amounts. Contact of methanol with the eyes can cause irritation and burns. Methanol is not considered to have adequate warning properties.

Methanol has not been found to be carcinogenic in humans. Information available is insufficient to characterize the reproductive hazard presented by methanol. In animal tests, the compound produced developmental effects only at levels that were maternally toxic; hence, it is not considered to be a highly significant hazard to the fetus. Tests in bacterial or mammalian cell cultures demonstrate no mutagenic activity

Flammability and Explosivity: Methanol is a flammable liquid (NFPA rating = 3) that burns with an invisible flame in daylight; its vapor can travel a considerable distance to an ignition source and "flash back." Methanol-water mixtures will burn unless very dilute. Carbon dioxide or dry chemical extinguishers should be used for methanol fires.

Reactivity and Incompatibility: Methanol can react violently with strong oxidizing agents such as chromium trioxide, with strong mineral acids such as perchloric, sulfuric, and nitric acids, and with highly reactive metals such as potassium. Sodium and magnesium metal react vigorously with methanol.

Storage and Handling: Methanol should be handled in the laboratory using the "basic prudent practices" described in Chapter 5.C, supplemented by the additional precautions for dealing with extremely flammable substances (Chapter 5.F <http://www.qrc.com/hhmi/science/labsafe/lcsstxt/lcsstx58.htm>). In particular, methanol should be used only in areas free of ignition sources, and quantities greater than 1 liter should be stored in tightly sealed metal containers in areas separate from oxidizers.

Accidents: In the event of skin contact, immediately wash with soap and water and remove contaminated clothing. In case of eye contact, promptly wash with copious amounts of water for 15 min (lifting upper and lower lids occasionally) and obtain medical attention. If methanol is ingested, obtain medical attention immediately. If large amounts of this compound are inhaled, move the person to fresh air and seek medical attention at once. In the event of a spill, remove all ignition sources, soak up the methanol with a spill pillow or absorbent material,

place in an appropriate container, and dispose of properly. Respiratory protection may be necessary in the event of a large spill or release in a confined area. -- from <http://www.qrc.com/hhmi/science/labsafe/lcsstxt/lcsstx58.htm>

3.) Question: *What happens if I get methanol into an open wound/cut?*

Answer: Emergency/First Aid Procedure: In case of contact, immediately flush skin/wound with plenty of water for at least 15 minutes.

4.) Question: *What should be done if methanol gets splashed in a samplers eye?*

Answer: In case of eye contact, promptly wash with copious amounts of water for 15 min (lifting upper and lower lids occasionally) and obtain medical attention. If methanol is ingested, obtain medical attention immediately.

5.) Question: *Is there significant potential for employee injury due to shattered and flying glass from methanol ampules?*

Answer: At all times proper safety precautions must be followed. To prevent injury from flying/shattering glass, safety goggles must be worn.

6.) Question: *What type of gloves should we wear to prevent contact with methanol?*

Answer: According to the MSDS, it is recommended that rubber gloves be worn when handling methanol.

Data Interpretation

1.) Question: *How do we compare/explain/interpret the results of samples analyzed using the different methods, like headspace GC or others, at the same site in the same location in our records or reports?*

Answer: Method 5035 results are the most accurate representation of contaminant concentration for the same location at any given point in time. Because the contaminants that are being sampled for are volatile contaminants, contaminant concentrations in a particular spot can vary over time and can even be influenced by weather conditions. However, all things being equal, Method 5035 will be the most accurate method of sampling and analysis of VOC contaminated soil.

2.) Question: *What about sediments/sludge/high moisture content samples? How does high moisture content in samples affect results? How are results from samples with high moisture content reported to me on a lab sheet?*

Answer: Presently, the MDEQ lab reports only the dry weight analytic results. High moisture content increases the detection limit for a sample. At present, there are no standardized reporting requirements for moisture content and analytical results for outside laboratories. MDEQ is presently considering

whether there should be standardized reporting of moisture content of samples and basis of the analysis (dry weight vs. wet weight analysis.)

EPA and the MDEQ lab recommends reporting concentrations in dry weight in order to report results that can be correlated between sample events. Method 5035 requires the collection of an unpreserved soil sample for the determination of % Total Solids.

3.) Question: *No Michigan labs perform this analysis at this time, and there will be difficulty in split sampling, as different methodologies will be used, so the results between DEQ and PLP will not be comparable. How do we handle split sampling with different analysis methods?*

Answer: One Michigan lab and possibly others have been performing this method for sometime. Most if not all Michigan labs, have been performing the analytical method (methanol extraction) for many years. The difference in the new method is that the methanol is added in the field and not in the lab. Additionally, the required detection limits are lower for the methanol extraction process than required in the past. However, the new detection limits are not considered difficult to meet with existing equipment that labs in the State already use. Thus, even if few labs are presently prepared to run the method, the transition time will be relatively short. At least one lab is already offering training to consultants on the use of the new method.

The one difficulty that a Potentially Liable Party might encounter is that, not all labs nation wide (outside Michigan and Wisconsin) will be prepared to run the new method with lower detection limits. Labs should be contacted prior to field work to determine if they are capable of achieving MDEQ detection limits using methanol extraction.

If split sampling is done using different methods other than those detailed in Method 5035, Method 5035 results will be the most accurate. It would be up to the party using any other method to document the methods technical equivalency with Method 5035.



JOHN ENGLER, Governor

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December 28, 2000

SUPERVISOR'S LETTERLetter No.: 2000-1Effective Date: December 28, 2000

TO: Geological Survey Division Staff

FROM: Harold R. Fitch, Chief, Geological Survey Division

SUBJECT: Staff Designations Under the Administrative Rules of Part 615, Supervisor of Wells, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

This Supervisor's Letter has been developed for the purpose of designating staff or operating units within the Geological Survey Division (GSD) or other offices within the Department of Environmental Quality with specific responsibilities in accordance with provisions set forth in the administrative rules under Part 615. The administrative rules contain numerous provisions which require the review, acceptance, or approval of the Supervisor of Wells (Supervisor) or authorized representative of the Supervisor. This document has identified each citation in the administrative rules for Part 615 that require an action by the Supervisor or authorized representative of the Supervisor and designates who has responsibility for performing the task or making the decision.

Responsibilities	Rule Citation	Designation
Receive signed/sealed copy of survey with permit application	R 324.201(2)(c)	Professional Staff Permits and Bonding Unit, GSD
Receive and accept application to drill and operate oil and/or gas wells, prescribe forms for application	R 324.201(2)(d)	Professional Staff Permits and Bonding Unit, GSD
Issue instructions for preparation of an environmental impact assessment	R 324.201(2)(f)	Professional Staff Permits and Bonding Unit, GSD
Receive an organization report	R 324.201(2)(g)	Professional Staff Permits and Bonding Unit, GSD
Hold hearing to allow disposal into a producing formation	R 324.201(2)(j)(vii)	Division Chief, GSD
Review applications	R 324.201(4)	Professional Staff Permits and Bonding Unit, Professional Field Staff, GSD

Responsibilities	Rule Citation	Designation
Issue permits	R 324.201(4)	Professional Staff Permits and Bonding Unit, GSD
Deny permits	R 324.201(4)	Division Chief, GSD
Issue directional drilling permits	R 324.202(1)	Professional Staff Permits and Bonding Unit, GSD
Verbal approval to directionally redrill	R 324.202(2)	Professional Staff Permits and Bonding Unit, Professional Field Staff, GSD
Verbal approval to skid rig	R 324.203(2)	Professional Staff Permits and Bonding Unit, Professional Field Staff, GSD
Determination of permit eligibility	R 324.205	Professional Staff Permits and Bonding Unit, GSD
Authorize change of well location prior to commencement of drilling	R 324.206(2)(a)	Professional Staff Permits and Bonding Unit, GSD
Authorize change of drilling method prior to commencement of drilling	R 324.206(2)(b)	Professional Staff Permits and Bonding Unit, GSD
Authorize change of well location after commencement of drilling	R 324.206(3)(a)	Professional Staff Permits and Bonding Unit, GSD
Authorize other permit changes after commencement of drilling	R 324.206(3)(b)	Professional Staff Permits and Bonding Unit, Professional Field Staff, GSD
Issue permits to deepen below stratigraphic horizon	R 324.206(4)	Professional Staff Permits and Bonding Unit, GSD
Authorize continuation of drilling	R 324.206(5)	Professional Field Staff, GSD
Approve transfers of permits	R 324.206(6)	Professional Staff Permits and Bonding Unit, GSD
Approve transfer of permit per compliance schedule	R 324.206(7)	Division Chief, GSD
Suspend well operations for failure to transfer permit	R 324.207	Division Chief, GSD
Authorize initial temporary abandonment	R 324.209(1)	District Supervisor, GSD
Authorize extensions of temporary abandonment	R 324.209(3)	Division Chief, GSD
Receive and prescribe forms for conformance bonds	R 324.210(1)	Supervisor, Permits and Bonding Unit, GSD
Receive statements of financial assurance	R 324.210(4)	Supervisor, Permits and Bonding Unit, GSD
Receive updated statements of financial assurance	R 324.210(5)	Supervisor, Permits and Bonding Unit, GSD
Receive alternate financial assurance	R 324.210(6)	Supervisor, Permits and Bonding Unit, GSD
Require updated report of financial assurance	R 324.210(7)	Division Chief, GSD

Responsibilities	Rule Citation	Designation
Review updated reports of financial assurance	R 324.210(7)	Division Chief, GSD
Notify permittee of ineligibility for financial assurance	R 324.210(7)	Division Chief, GSD
Suspend well operations for failure to provide alternate financial assurance	R 324.210(7)	Division Chief, GSD
Require additional bonds	R 324.210(8)	Division Chief, GSD
Approve release of bond at final completion	R 324.211(1)(b)	Supervisor, Permits and Bonding Unit, GSD
Otherwise approve release of bond	R 324.211(1)(c)	Supervisor, Permits and Bonding Unit, GSD
Invoke bond	R 324.211(2)	Division Chief, GSD
Receive blanket and single well bonds	R 324.212	Supervisor, Permits and Bonding Unit, GSD
Receive list of wells covered by blanket bond.	R 324.212(c)	Supervisor, Permits and Bonding Unit, GSD
Cancellation of surety bond	R 324.213(1)	Professional Staff Permits and Bonding Unit, GSD
Suspend well operations for failure to secure conformance bond from another surety company	R 324.213(2)	Division Chief, GSD
Release surety liability pending corrections	R 324.213(3)	Division Chief, GSD
Receive notice limiting liability on blanket bond	R 324.214	Professional Staff Permits and Bonding Unit, GSD
Release bonds	R 324.215(1)	Supervisor, Permits and Bonding Unit, GSD
Release of bonds following acceptance of corrected deficiencies	R 324.215(2)	Division Chief, GSD
Notify surety and permittee of bond release and return bonds	R 324.216(1)	Professional Staff Permits and Bonding Unit, GSD
Return cash when conformance bond is released	R 324.216(2)	Professional Staff Permits and Bonding Unit, GSD
Authorize spacing exceptions for environmental reasons	R 324.301(1)(b)(ii)	Division Chief, GSD
Exceptions to spacing pursuant to a hearing	R 324.301(2)(a)	Division Chief, GSD
Exception to well location within 300 feet of water well or residence with consent of owner	R 324.301(2)(b)	Professional Staff Permits and Bonding Unit, GSD
Exception to well location within 300 feet of water well or residence after hearing	R 324.301(2)(c)	Division Chief, GSD

Responsibilities	Rule Citation	Designation
Approval to pool or communitize tracts	R 324.301(2)(d)	Division Chief, GSD
Approval of special spacing orders	R 324.302	Division Chief, GSD
Approval to abrogate spacing within pooled area	R 324.303(2)	Division Chief, GSD
Approval to voluntarily pool interests	R 324.303(3)	Division Chief, GSD
Compulsory pooling interests	R 324.304	Division Chief, GSD
Receive drilling notifications	R 324.402	Professional Field Staff, GSD
Receive and file geologic records for Part 615 water wells	R 324.403(2)(d)	Professional Staff Permits and Bonding Unit, GSD
Approve sources for drilling fluids or brines	R 324.405	Professional Field Staff, GSD
Approve blowout preventer (BOP) and other well control systems	R 324.406(1)(a)	District Supervisor, GSD
Blowout prevention equipment testing	R 324.406(4)	Professional Field Staff, District Supervisor, GSD
Change or modify fluid monitoring system	R 324.406(5)	District Supervisor, GSD
Exception when drilling in shallow low-pressure formations	R 324.406(6)	District Supervisor, GSD
Prohibit drilling pits	R 324.407(1)	Field Operations Supervisor, GSD
Containment of drill cuttings, muds and fluids	R 324.407(2)	Professional Field Staff, GSD
Exception to the requirement for the use of tanks while drilling in residential area	R 324.407(3)	Field Operations Supervisor, GSD
Approve location of drilling mud pits	R 324.407(4)	Professional Field Staff, GSD
Approve methods for pit solidification	R 324.407(4)(b)	Division Chief, GSD
Approval to relocate pit at the well site	R 324.407(4)(c)	Professional Field Staff, GSD
Approve off-site pit locations	R 324.407(4)(d)	District Supervisor, GSD
Approval of mud pit liner	R 324.407(6)(a)	Division Chief, GSD
Approve use of water-based drilling muds and entrained cuttings	R 324.407(7)(b)(v)	Field Operations Supervisor, GSD
Provide certification of testing of fluids and cuttings	R 324.407(7)(e)	Professional Field Staff, GSD
Approval of alternative pit stiffening process	R 324.407(9)(b)	Division Chief, District Supervisor, GSD
Approval of mud pit cover	R 324.407(9)(e)	Division Chief, GSD
Sealing of surface casing with cement or equivalent materials	R 324.408(2)	District Supervisor, GSD

Responsibilities	Rule Citation	Designation
Approval of casing equipment drilled with cable tools	R 324.409	District Supervisor, GSD
Approval of casing other than surface casing	R 324.410(1)	Division Chief, GSD
Approved use of casing to seal off zones	R 324.410(2)	Division Chief, GSD
Grant exceptions to minimum hole sizes	R 324.410(4)	Supervisor, Technical Services Section, GSD
Approve - composition and volume of cement for casing - composition and design of casing above gas storage reservoirs	R 324.411	Division Chief, Professional Staff Permits and Bonding Unit, GSD
Approved method of sealing annular space from pulling casing	R 324.412(2)	Professional Field Staff, GSD
Approved surface casing and protective casing string	R 324.413(d)	District Supervisor, Professional Staff Permits and Bonding Unit, GSD
Approval of intermediate casing, multistage cementing operations and external casing packers, pressure testing of intermediate casing and blowout preventers	R 324.413(f)	District Supervisor, GSD
Approve equivalent test for centralized cement bond evaluation log	R 324.413(h)	Division Chief, GSD
Approve wellhead equipment and assemblies	R 324.413(i)	District Supervisor, GSD
Request service company records	R 324.416(2), (3)	Professional Staff, GSD
Request drilling samples	R 324.417(2), (3)	Professional Staff Petroleum Geology and Production Unit, GSD
Request cores or core samples	R 324.417(4)	Division Chief, GSD
Receive records after drilling completion, requests elevation of top of cement be measured	R 324.418(a)(vii)	District Supervisor, GSD
Request a listing of all borehole logs run by a permittee	R 324.419(2)	Professional Staff, GSD
Approve intervals for directional surveys	R 324.421	Supervisor, Technical Services Section, GSD
Approve sealing of cellars and rat and mouse holes with cement or other suitable material	R 324.422(2)	Division Chief, GSD
Receive notification of well completion operations starting	R 324.503(2)	Professional Field Staff, GSD

Responsibilities	Rule Citation	Designation
Approval, after hearing, of surface facility location less than 330 feet from water well or structure	R 324.504(3)(b)	Division Chief, GSD
Approval of installation of surface facilities and flow lines	R 324.504(4)	District Supervisor, GSD
Approval of construction, operation or reconstruction of surface facility or flow line subsequent to drilling permit issuance	R 324.504(5)	District Supervisor, GSD
Approval of power sources for pump jacks	R 324.505(a)	District Supervisor, GSD
Approval for variance of surface facility and/or flare stack for wells with 300 ppm or more of hydrogen sulfide in residentially zoned areas	R 324.506(1)(b), (2)	Division Chief, GSD
Approval of multiple zone completions	R 324.508	Supervisor, Permits and Bonding Unit, District Supervisor, GSD
Approval of commingling of oil and gas	R 324.509	Supervisor, Petroleum Geology and Production Unit, GSD
Approval to begin operation of central production facility	R 324.510(1)	Division Chief, GSD
Approval of change to existing central production facility	R 324.510(2)	Division Chief, GSD
Approval of change of well status	R 324.511(1)	Professional Field Staff, GSD
Establishment of prorated allowables following a hearing	R 324.601(1)	Division Chief, GSD
Approval to make up underages of allowable production	R 324.602(2)	Division Chief, GSD
Approval of methods to correct overages in allowable production	R 324.602(3)	Division Chief, GSD
Approval of alternative measurement and allocation methods for production from prorated wells	R 324.604	Division Chief, GSD
Approval of capacity tests for prorated wells	R 324.605(1)	Professional Field Staff, Professional Staff Petroleum Geology and Production Unit, GSD
Require special capacity tests of well(s)	R 324.607(1)	Professional Field Staff, Professional Staff Petroleum Geology and Production Unit, GSD
Approval of tests to determine maximum efficient rate of a well(s)	R 324.607(2)	Professional Staff Petroleum Geology and Production Unit, GSD

Responsibilities	Rule Citation	Designation
Require subsurface pressure, gas-oil ratio and other tests	R 324.609	Professional Staff Petroleum Geology and Production Unit, GSD
Approve extension of time or exemption from monthly reporting of oil and/or gas	R 324.610	Supervisor, Petroleum Geology and Production Unit, GSD
Hold meetings and issue orders of determination for a change in field allowables	R 324.611	Professional Staff Petroleum Geology and Production Unit, GSD
Approval of certified well survey from directionally drilled well(s) prior to production testing	R 324.613(2)	Division Chief, GSD
Ensure wastes are stored, transported and disposed of in an approved manner	R 324.701	Division Chief, GSD
Grant temporary permission to use annular space for waste disposal	R 324.704	Division Chief, GSD
Approve disposal methods for brine	R 324.705(3)	Division Chief, GSD
Approve brine for other uses instead of disposal	R 324.705(3)(d)	Professional Staff Minerals and Groundwater Unit, GSD
Receive chemical analysis of brine to be approved for other uses	R 324.705(3)(d)(iii)	Professional Staff Minerals and Groundwater Unit, GSD
Inspect records maintained for disposition of brine approved for other uses	R 324.705(4)	Professional and Paraprofessional Field Staff, Professional Staff Minerals and Groundwater Unit, GSD
Approve subsurface stratum used for injection	R 324.801(3)	Professional Field Staff, Professional Staff Permits and Bonding Unit, GSD
Grant authority for 30-day injection test	R 324.802	District Supervisor, GSD
Receive notification of MIT test of injection well; receive and evaluate MIT test results; approve injection	R 324.803(2)	Professional Staff Petroleum Geology and Production Unit, GSD
Receive notification of 5-year MIT test of injection well; request copy of test results	R 324.805(2)	Professional Field Staff, Professional Staff Petroleum Geology and Production Unit, GSD
Approve MIT test methods for injection wells	R 324.805(3)	Division Chief, GSD
Develop forms for reporting injection data; establish frequency of reporting for brine disposal wells	R 324.806(1)	Professional Staff Petroleum Geology and Production Unit, GSD

Responsibilities	Rule Citation	Designation
Receive reports of injection data; approve resumption of injection if annual summary report is not timely filed	R 324.806(2)	Professional Staff Petroleum Geology and Production Unit, GSD
Receive verbal notification of loss of mechanical integrity of an injection well	R 324.807(1)	Professional Field Staff, GSD
Receive written notice of loss of mechanical integrity of an injection well; approve change of well status if required for repair	R 324.807(2)	Professional Field Staff, GSD
Approve of cementing procedure, issue plugging instructions and receive plugging notifications, approval of surface pipe/drive pipe seal	R 324.901 R 324.902(1)-(3), (6), (7), (9)	Professional Field Staff, GSD
Request service company records and graphics	R 324.902(10)(e), (f)	Professional Field Staff, GSD
Approval of alternative plugging materials	R 324.902(11)	Division Chief, GSD
Require proof that well has been economically produced	R 324.903(1)	District Supervisor, GSD
Approval of temporary abandonment status – initial term	R 324.903(2)	Division Chief, GSD
Approval of temporary abandonment status - beyond initial term	R 324.903(3)	Division Chief, GSD
Require removal of surface or conductor casing	R 324.904	Division Chief, GSD
Approval to clear flammable and combustible materials for distances other than 75 feet from well and tank locations and to require fire lines	R 324.1001	District Supervisor, GSD
Require surface facilities to be upgraded to current secondary containment requirements and construction standards	R 324.1002(1)	District Supervisors, GSD
Approve or disapprove secondary containment plans	R 324.1002(2)	District Supervisors, GSD
Receive reports of flow line or facility piping inspections and pressure tests	R 324.1002(3)(l)(ii)(B) R 324.1002(3)(l)(iii)(E)	District Supervisors, GSD
Approve or require alternate pressure testing or leak detection methods	R 324.1002(3)(l)(iii)(G)	Division Chief, GSD
Approve buried piping location identifying markers	R 324.1002(3)(l)(iv)	District Supervisors, GSD

Responsibilities	Rule Citation	Designation
Receive secondary containment certifications, spill and loss response or remedial action plans	R 324.1002(4)	District Supervisors, GSD
Approve or deny modifications of secondary containment areas	R 324.1002(5)	District Supervisors, GSD
Require automatic facility shutdown systems	R 324.1002(7)	District Supervisors, GSD
Receive sample analysis from monitoring systems	R 324.1002(8)	District Supervisors, GSD
Authorization for right of entry to facilities	R 324.1002(9)	Professional and Paraprofessional Staff, GSD
Approval of well site restoration	R 324.1003	Professional and Paraprofessional Field Staff, GSD
Require installation of fences, gates or other safety measures	R 324.1004	District Supervisors, GSD
Receive verbal notification of accidents or spills	R 324.1007(1) R 324.1008(2)	Professional Field Staff, GSD
Receive written reports of accidents and spills	R 324.1007(1) R 324.1008(3)	District Supervisors, GSD
Issue instructions for reporting of losses or spills	R 324.1008(1)	Division Chief, GSD
Receive notification of purging of flow line or vessels	R 324.1011	Professional and Paraprofessional Field Staff, GSD
Require the removal of flow lines and vessels	R 324.1011	District Supervisors, GSD
Immediately require corrective action or suspension of any operation or practice, which is a violation and threatens public health and safety	R 324.1014(1)	District Supervisors, GSD
Issue emergency orders for suspension of operations	R 324.1014(2)	Division Chief, GSD
Require collection of data, determine if nuisance noise exists, require noise controls and approve noise abatement plans	R 324.1015(2)	District Supervisors, Professional and Paraprofessional Field Staff, GSD
Approve sound abatement plans for compressors	R 324.1016(3)	District Supervisors, GSD
Require submittal of information to determine applicability of H ₂ S rules	R 324.1105(6)	Professional and Paraprofessional Field Staff, GSD
Grant exception to setback distance for a Class II, III or IV H ₂ S well	R 324.1106(2)	District Supervisor, GSD

Responsibilities	Rule Citation	Designation
Require relocation of a facility not meeting setback requirements	R 324.1106(3)	District Supervisor, GSD
Require submittal of contingency plans	R 324.1110(4)	Professional Staff Permits and Bonding Unit, GSD
Require periodic updates of contingency plans	R 324.1110(4)	Professional and Paraprofessional Field Staff, GSD
Receive requests for an exception to requirement to prepare a map and list of residences	R 324.1110(5)	Professional Staff Permits and Bonding Unit, GSD
Confer with local emergency preparedness coordinator on appropriateness of granting exception	R 324.1110(5)	District Supervisor, GSD
Require compliance with R 324.1112 to R 324.1116 by the time drilling reaches 500 feet above projected top of geological stratum suspected to contain H ₂ S	R 324.1111	District Supervisor, GSD
Require safety equipment in addition to that listed in R 324.1102(d) if necessary	R 324.1112(2)	District Supervisor, GSD
Witness testing and calibration of detection and warning system	R 324.1115(3)	Professional and Paraprofessional Field Staff, GSD
Require use of additional safety equipment	R 324.1115(7)	District Supervisor, GSD
Approve procedure for measuring H ₂ S concentrations	R 324.1116(1)(c), (2)(b) R 324.1117(2)	Professional Staff Petroleum Geology and Production Unit, GSD
Require additional safety equipment	R 324.1117(1)(d)(v)	District Supervisor, GSD
Grant exceptions to R 324.1117	R 324.1117(5)	District Supervisor, GSD
Require periodic gas analysis to determine H ₂ S concentration	R 324.1118(1), (2)	Professional Staff Petroleum Geology and Production Unit, GSD
Receive notification prior to sampling and analysis and written report within 1 month of analysis	R 324.1118(3), (4)	Professional Staff Petroleum Geology and Production Unit, GSD
Require additional fencing if threat to public safety exists	R 324.1122(3)	District Supervisor, GSD
Prohibit venting of vapor to the atmosphere, if chronic nuisance odor	R 324.1122(4)	Division Chief, GSD
Require the use of a tank gauging system	R 324.1122(6)	Professional and Paraprofessional Staff, GSD

Responsibilities	Rule Citation	Designation
Require additional fencing if a threat to public safety exists due to emissions from incinerator or flare	R 324.1123(2)	District Supervisor, GSD
Require a flare or incinerator stack more than 20 feet high	R 324.1123(3)	District Supervisor, GSD
Grant exception to requirement for a line conveying released gasses or vapors to an incinerator or flare	R 324.1124	Division Chief, GSD
Rescind allowance for truck vapor vent lines if nuisance odors are caused by the use of the vent lines	R 324.1126(2)	District Supervisor, GSD
Grant exceptions to R 324.1119, R 324.1123, R 324.1125, R 324.1126, and R 324.1127	R 324.1127(2)	Division Chief, GSD
Require use of additional safety equipment	R 324.1128(c)	District Supervisor, GSD
Require permittee to perform numerical modeling; determine existence of nuisance odor; require appropriate emission control measures; and require and approve a timetable for installation of any equipment required	R 324.1129	Division Chief, GSD
Schedule and initiate hearings, expand scope of hearing, return deficient petition, provide AFE form	R 324.1201 R 324.1202(4) R 324.1203 R 324.1204(5)	Division Chief, GSD
Prepare and furnish Notice of Hearing, authorize service of Notice in a reasonable manner	R 324.1204(1), (2), (4), (5), (8) R 324.1210(1)	Division Chief, GSD
Review petition for completeness, designate type of hearing, schedule prehearing conference	R 324.1205(1), (2), (3)	Division Chief, GSD
Dispose of contested matter by stipulation and consent order	R 324.1205(6)	Division Chief, GSD
Issue final decision or order as a result of a hearing	R 324.1206(1)(c), (3)	Division Chief, GSD
Approve pooling of properties or parts of properties	R 324.1206(4)	Division Chief, GSD
Issue subpoenas ordering a party or witness to attend and testify at an oral hearing, quash or modify a subpoena if it is unreasonable or oppressive, order discovery	R 324.1207(1), (2), (3)	Division Chief, GSD and DEQ Administrative Law Judge
Order continuance of a hearing	R 324.1208	Division Chief, GSD

Responsibilities	Rule Citation	Designation
Hold hearing pursuant to an administrative complaint	R 324.1210(2)	Division Chief, GSD
Issue emergency orders and hold emergency hearings	R 324.1211(1), (2)	Division Chief, GSD
Enforce rules, issue orders, determinations, and instructions necessary to enforce the rules and regulations, and do whatever may be necessary to carry out the purposes of these rules and the act	R 324.1301(a)	Division Chief, GSD
Order the suspension of any or all components of the operation when a violation exists. Prohibit the purchaser from taking oil, gas or brine from the lease during the required suspension time, order a well plugged for continuing violation of the act or these rules	R 324.1301(b)	Division Chief, GSD

Approved: _____



Harold R. Fitch, Chief

12-28-00

Date

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

October 2, 2000

SUPERVISOR'S LETTER

Letter No. 2000-2
Effective Date: October 2, 2000

TO: Geological Survey Division Staff
FROM: Harold R. Fitch, Chief, Geological Survey Division
SUBJECT: Transfer of Permits; Unsatisfactory Conditions

Recent experience has demonstrated a need to modify the current Geological Survey Division (GSD) process for evaluating requests for transfer of permits pursuant to Part 615, Supervisor of Wells, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, R 324.206(8) states, in part:

If the permittee of a well is under notice because of ***unsatisfactory conditions*** at the well site involved in the transfer, then the permit for a well shall not be transferred to a person until the permittee has completed the necessary corrective actions or the acquiring person has entered into a written agreement to correct all of the ***unsatisfactory conditions*** (Emphasis Supplied)

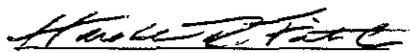
Previously, the phrase "unsatisfactory conditions" was interpreted to mean any noncompliance with the administrative rules of Part 615, no matter how minor the infraction. Requiring written agreements (consent agreements) as a condition for the transfer of permits for wells where only minor violations were observed has resulted in excessive demands on GSD staff time in relationship to the compliance benefits and has created an unacceptable backlog of pending permit transfers.

Upon the effective date of this Supervisor's Letter, the following policy shall be in effect for permit transfers:

1. "Unsatisfactory conditions," for the purposes of permit transfers, shall include all violations defined as "significant," excluding those violations defined as "minor." The types of violations are described as follows:
 - a. "Significant violations" include all hydrogen sulfide (H₂S) violations; violations that pose a threat to the public health, safety or the environment; the failure to plug or produce a well; spills, leaks, and resultant contamination that pose a threat to the groundwater or surface waters of the state.
 - b. "Significant violations" also include failure of the permittee to file required records, since the absence of those records significantly impedes the ability of the GSD to investigate and develop cases involving threats to the public health, safety or the environment.

- c. "Minor violations" generally are defined as those that do not pose a threat to the public health, safety or the environment. These violations may include the minor staining of soils with oil; debris at the well site; flammable and combustible materials within a radius of 75 feet of the wells and surface facilities; containment dikes that are too low; and similar types of violations.
 - d. For the purposes of the transfer of a permit, and since the acquiring operator shall be required to provide a new identification sign with updated information, a missing identification sign or one that lacks proper lettering shall be deemed a "minor violation." The acquiring permittee shall be required to erect the updated signs within 30 days of the date of the transfer of permit.
2. When inspecting a well site for the requested transfer of permit, GSD staff shall classify all existing violations as either a "significant violation" or a "minor violation." If only minor violations are found, GSD staff shall note "no unsatisfactory conditions, only minor violations" in the comment portion of the MIR Transfer Checklist. If significant violations are found, GSD staff shall note "unsatisfactory conditions" in the comment portion of the MIR Transfer Checklist. GSD staff shall mail duplicate copies of the completed Notice of Inspection of Oil and Gas Operation forms to both the current (selling) permittee and the acquiring permittee that identify all existing violations.
 3. The GSD Permits and Bonding Unit will proceed to transfer permits for wells without violations as well as those with only "minor violations" identified on the MIR Transfer Checklist.
 4. For wells with "significant violations," or a well having a combination of both "significant violations" and "minor violations" the GSD will require that the violations be corrected prior to transfer of the permit or a consent agreement signed. The consent agreement shall include all violations noted at the site. GSD staff will follow up with inspections of well sites for deadline dates in consent agreements and with escalated enforcement (such as suspension of operations, withholding of permits, bond forfeiture, plugging or cleanup action by the state), if necessary.
 5. The fact that a violation is deemed "minor" for the purposes of transferring a permit does not exclude future enforcement of those minor violations if they are not corrected by the acquiring permittee in a timely manner. However, the existence of only "minor violations" will not prevent the transfer of a permit, unless the current (selling) permittee has been previously cited for the violations in a notice of noncompliance.
 6. In order to alleviate the current backlog of pending permit transfers and expedite the processing of said transfers, GSD staff shall review all pending permit transfer applications. GSD staff are to determine if there are pending transfers for any wells with "minor violations only" and update their remarks and approvals as needed, on the MIR Transfer Checklist for the GSD Permits and Bonding Unit to continue processing permit transfer applications.

Approved:


Harold R. Fitch, Chief10-2-00

Date

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

June 21, 2004

SUPERVISOR'S LETTER

Letter No.: 2004-1
Effective Date: Immediately

TO: Geological Services Section Staff

FROM: Harold R. Fitch, Chief, Geological and Land Management Division

SUBJECT: Permitting and Inspection of Oil and Gas Wells With Directionally Drilled Surface Holes

Proposals for oil and gas wells with directionally drilled surface holes require special consideration to assure protection of ground water and other resources. Where feasible, preference should be given to an alternative well location that will not need a directional surface hole. However, there are some instances where a directional surface hole is the best option when considering all factors, including environmental protection, drilling and production efficiency, and land use restrictions.

The administrative rules under Part 615, Supervisor of Wells, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, contain the following pertinent provisions regarding drilling, casing, and sealing of surface holes:

R 324.405 states, in part: "The drilling fluid used for drilling wells described in R 324.201(1) shall be capable of sealing off and protecting each oil, gas, brine, or fresh water stratum above the stratigraphic or producing horizon and controlling subsurface pressures...."

R 324.408 states: "(1) Surface casing shall be set a minimum of 100 feet below the base of the glacial drift into competent bedrock and 100 feet below all fresh water strata. (2) Surface casing shall be cemented pursuant to R 324.411 and shall be circulated to the surface. If the cement falls back or fails to circulate to the surface, then the open annulus space shall be sealed with cement or other equivalent materials approved by the supervisor or authorized representative of the supervisor before resuming drilling."

R 324.411 states, in part: "Well casing shall be cemented by the pump and plug method or by a method approved by the supervisor.... The cement mixture shall be of a composition and volume approved by the supervisor or authorized representative of the supervisor...."

Where a directional surface hole is the best alternative, permits should include the following conditions:

1. Fresh water drilling mud used in drilling the surface hole shall have a funnel viscosity sufficient to maintain the integrity of the surface hole until surface casing is set. The hole shall be circulated clean prior to cementing casing.
2. The True Vertical Depth (TVD) of the surface casing shoe shall be a minimum of 100 feet below the base of the glacial drift into competent bedrock and 100 feet below all fresh water strata.
3. Surface casing shall be equipped with at least two centralizers, one located 30 feet below the top of bedrock and the other located 30 feet above the casing shoe.
4. Class A cement or equivalent shall be used from the casing shoe to at least 100 feet (TVD) above the Base of Drift (BOD), or to the surface, whichever is less.

In scheduling inspections of drilling operations, staff shall place a high priority on witnessing the installation and cementing of surface casing in wells with directional surface holes.

Approved:

 6/21/04

Harold R. Fitch
Assistant Supervisor of Wells

Date

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

SUPERVISOR'S LETTER

Letter No.: 1-2007
Effective Date: Immediately

TO: Staff of District Offices and Permits and Bonding Unit, Office of Geological Survey

FROM: Harold R. Fitch, Director, Office of Geological Survey

DATE: June 18, 2007

SUBJECT: Minimum Distances from Drill Pads to Structures and Water Wells

Rule R324.301(1)(b)(v) under Part 615, Supervisor of Wells, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, establishes a minimum distance between the surface location of an oil and gas well and an existing fresh water well utilized for human consumption or an existing structure used for public or private occupancy (which I will refer to as "water well" and "structure"). Recently concerns have been expressed to me that consideration should also be given to setback distances from the edge of the drill pad, since the edge of the pad conceivably could be extended very close to a residence without violating the above rule.

As you are aware, our primary mission in the oil and gas program is to prevent waste as defined in Part 615. In the case of setback distances, I find there is a need to clarify what may constitute waste—in particular, the "unnecessary damage to or destruction of the surface; soils; animal, fish, or aquatic life; property; or other environmental values from or by oil and gas operations" (see Part 615, Section 61501(q)(ii)(B)).

Drill pads for shallow wells are typically about 200 feet by 200 feet in size while drill pads for deeper wells are typically about 300 feet by 300 feet in size. The drill pad is routinely constructed such that the well surface location is in the approximate center of the pad. The edge of the pad would therefore be expected to be a minimum of 150 feet to 200 feet from a water well or structure. The construction of a pad of a size that would unnecessarily encroach on a water well or structure may be considered as possible surface waste.

To prevent surface waste, a new Permit to Drill and Operate shall not be granted if the edge of the drill pad will be less than 150 feet from a structure or water well, unless specifically approved by the Assistant Supervisor of Wells. Such approval will not be granted except in extenuating circumstances, such as when specifically agreed to in writing by the owner of the structure. The Transmittal and Field Review for Proposed Well Site Form (EQ7239) has been revised by adding Box 11b, which asks "Is any area of the pad closer than 150 to a structure or water well?"

In conducting a field review, OGS staff shall do the following:

1. If the well location is such that the drill pad is expected to be more than 150 feet from a water well or structure under any reasonable drill pad configuration or if the application verifies—either through a written statement or a detailed plat—that the pad will not encroach within 150 feet from a structure or water well, state "No" in Box 11b, and proceed as usual.

2. If it appears possible that the well pad might encroach within 150 feet of a structure or water well, and the application does not verify the location of the edge of the drilling pad:
 - a. If the 150-foot setback can be met based on discussions with the applicant, state "No" in Box 11b and impose a permit condition stating that no part of the drill pad shall be within 150 feet of an existing fresh water well utilized for human consumption or an existing structure used for public or private occupancy.
 - b. If the 150-foot setback cannot reasonably be met, state "Yes" in Box 11b; add your recommendation as to whether an exception should be granted; and forward the Field Review to the Assistant Supervisor of Wells for a final decision.

Approved:


Harold R. Fitch
Assistant Supervisor of Wells

June 18, 2007
Date

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

SUPERVISOR'S LETTER

Letter No. 2007-2
Effective Date: Immediately

TO: District Staff and Permits and Bonding Unit Staff, Office of Geological Survey
FROM: Harold R. Fitch, Director, Office of Geological Survey
DATE: October 15, 2007
SUBJECT: Definition of "Lateral Drain Hole"

For purposes of interpretation of the provisions of Supervisor of Wells Order No. (A) 14-9-94, the term "Lateral Drain Hole" (also referred to as "Horizontal Drain Hole") is as follows:

"A lateral drain hole means that portion of a well bore exceeding 75 degrees deviation from the vertical and a horizontal projection within the producing formation that exceeds 100 feet."

These high angle directional wells are therefore exempt from the requirement under Order No. (A) 14-9-94 that their bottom hole locations be no less than 1,320 feet apart.

Background

Supervisor of Wells Order No. (A) 14-9-94 and its amendments established spacing for wells drilled in the Antrim formation and provided for the establishment of Uniform Spacing Plans (USPs). It also provided for the completion of lateral drain hole(s) from each well within the Antrim formation.

Part 4.C. under "Determination and Order" of the order reads:

"The distance between bottom hole locations for standard vertical or conventional directional drilled wells within a USP shall be no less than 1,320 feet. Lateral drain holes drilled for completion purposes in conjunction with these wells are excluded from this requirement."

The terms "lateral drain hole," "conventional directional drilled," and "holes drilled for completion purposes" were not defined in the initial order. It was apparently assumed that a "lateral drain hole" would be drilled from a pre-existing vertical hole. The term "holes drilled for completion purposes" may have had original connotations of an activity occurring after a well had been drilled to total depth, i.e. an open hole horizontal/lateral segment to increase hydrocarbon flow to the well bore.

In more recent times, many lateral/horizontal drain holes have been drilled as a continuous hole from vertical to horizontal, often with a vertical section of the well being drilled later as a sump.

The latest drilling innovation in Antrim gas wells is a high angle (75° to 85°) directional well that penetrates both the Lachine and Norwood members of the Antrim formation for a significant distance (e.g., approximately 800 feet) and continues into the Traverse Limestone. The Traverse portion of the hole serves as a sump for water removal. These wells are fully cased, perforated in the Lachine or Norwood intervals, and sealed at the bottom of the casing in the Traverse Limestone.

When Order No. (A) 14-9-94 was issued (effective June 20, 1995), horizontal drain hole technology was not as advanced as it is today. For example, Item 14 of Finding of Facts states in part:

“The use of lateral drain hole technology for the development of Antrim gas is limited.”

It is obvious that not only is the use of lateral/horizontal drain hole technology an important part of drilling technology today, it has advanced in ways not foreseen in 1995. For example, in 2006, 21 percent of issued API numbers were for horizontal drain holes.

Consistent and reasonable application of the provisions of Order (A) 14-9-94 requires a workable definition of lateral drain hole since the nature of horizontal drilling has changed and its importance to the development of Antrim Shale gas has increased.

The definition of “lateral drain hole” stated above was formulated after considering the ramifications for well spacing and efficient development and reviewing various definitions utilized in other producing states.

Approved:



Harold R. Fitch
Assistant Supervisor of Wells

10/15/07
Date

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

SUPERVISOR'S LETTER

Letter No. 2009-1

Effective Date: Immediately

TO: Office of Geological Survey Staff
FROM: Harold R. Fitch, Director, Office of Geological Survey
DATE: February 27, 2009
SUBJECT: Acceptable Cementing Practices for Surface Casing

Recent experience has demonstrated a need to clarify the Office of Geological Survey's (OGS's) process for evaluating well surface casing and sealing programs. Three rules are pertinent to this matter: Rule R 324.408, R 324.410, and R 324.411 of Part 615, Supervisor of Wells, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

These rules state in part:

Rule 408(2). Surface casing shall be cemented pursuant to R 324.411 and shall be circulated to the surface. If the cement falls back or fails to circulate to the surface, then the open annulus space shall be sealed with cement or other equivalent materials approved by the supervisor or authorized representative of the supervisor before resuming drilling.

Rule 410(3). All casing, except for casing set pursuant to R 324.413, shall be of sufficient weight, grade, and condition to have a designed minimum internal yield of 1.2 times the greatest expected well bore pressure to be encountered.

Rule 411. Well casing shall be cemented by the pump and plug method or by a method approved by the supervisor and allowed to set undisturbed at static balance with the casing in tension, with surface pressure released, and with no backflow until the tail-in slurry reached 500 psi compressive strength but for not less than 12 hours; however, if backflow occurs, then the surface pressure shall not be released. The cement mixture shall be of a composition and volume approved by the supervisor or authorized representative of the supervisor.

The following five guidelines are to be used, in addition to other commonly used guidelines, when determining the adequacy of casing and sealing plans for surface casing.

1. A permittee may choose to cement the surface casing entirely with Type 1 or equivalent cement, or with a combination of a lite lead cement and a Type 1 equivalent tail cement. The yield of lite lead cements shall be no greater than 1.7 cu ft/sk and the slurry weight shall be no less than 13.1 pounds per gallon. This will assure that the cement being used will reach a satisfactory compressive strength within the timeframe set in R 411.

2. The movement of casing prior to the cement reaching sufficient compressive strength may cause the bond between the casing and cement to break and thus result in a micro annulus. To assure a good bond, the setting of casing slips is to take place as soon as possible after the cement is placed and before it begins to develop compressive strength. Alternately if the permittee decides to set casing slips at a later time, the casing is to be left in the casing hangers undisturbed until the cement has reached a compressive strength of 500 psi. In either case Rule 411 requires the casing to be left undisturbed for at least 12 hours.
3. Surface casing shall have tail cement consisting of Type 1 or equivalent. The minimum height of fill of the tail cement shall be 200 feet for shallow surface casings and 400 feet for long surface casings (such as intermediate casing exceptions). In order to assure that these minimum heights are met in the absence of a caliper survey, include an additional 25 per cent to the calculated tail cement volume.
4. In order to assure that cement circulates to the surface, cement volumes 75-100 per cent in excess of the calculated volume, using hole size and casing size, may be required. Cement volumes may be reduced if the permittee can demonstrate that a lesser volume would be adequate to reasonably assure cement circulation to the surface. In no case, however, is the cement volume to be less than 25 per cent in excess of the calculated volume using hole sizes and casing sizes.
5. In no case shall cement be used to make up for inadequate casing weight, grade, and condition as required by Rule 410(3).

OGS staff will consider the above when reviewing a permit application. Any questions regarding the above are to be directed first to the District Supervisor and secondarily to the Field Operations Supervisor.

Approved: 
Harold R. Fitch
Assistant Supervisor of Wells

Feb. 27, 2009
Date

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

SUPERVISOR OF WELLS LETTER

Letter No. 2011-1
Effective Date: Immediately

TO: Staff of District Offices and Permits and Bonding Unit, Office of Geological Survey

FROM: Harold R. Fitch, Chief, Office of Geological Survey

DATE: May 23, 2011

SUBJECT: Permit application reviews for wells that may be hydraulically fractured

The permit review practices covered by this letter are currently the subject of informal verbal direction. The purpose of this letter is to confirm that direction and to provide additional details. For clarification, "hydraulic fracturing" is defined as a well completion technique that involves pumping fluid and proppants into the target formation to create or propagate artificial fractures, or enhance natural fractures, for the purpose of improving the deliverability and production of hydrocarbons.

Staff of the Permits and Bonding Unit shall adhere to the following practice when conducting a review of an application for a Permit to Drill and Operate for an oil and gas well that may be hydraulically fractured:

1. Identify recorded existing or permitted well bores within the following radii of the proposed well:

Depth of Proposed Well	Radius of area to be reviewed
Less than 2000 feet	330 feet
2000 – 5000 feet	660 feet
More than 5000 feet	1320 feet

2. For existing or permitted wells identified in 1. that penetrate the zone that may be hydraulically fractured, determine whether the well may provide a conduit for movement of hydraulic fracturing fluids or produced fluids into a stratum containing fresh water. The determination shall take into account the anticipated radius of influence of the potential hydraulic fracturing.
3. If a potential conduit is identified in 2., require the applicant to do one of the following:
 - a. Relocate the proposed well to a location such that all potential conduits are outside the area of review.
 - b. Provide documentation demonstrating that the hydraulic fracturing will not cause the movement of hydraulic fracturing fluids or produced fluids into a fresh water aquifer.
 - c. Provide a written plan reflecting the actions or modifications necessary to prevent the potential fluid movement of concern.

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May 23, 2011
Page 2

4. Disputed cases will be referred for resolution through the Office of Geological Survey chain of command.



Harold R. Fitch
Assistant Supervisor of Wells