



RAILROAD COMMISSION OF TEXAS

OFFICE OF GENERAL COUNSEL

MEMORANDUM

TO: Chairman Barry T. Smitherman
Commissioner David Porter
Commissioner Christi Craddick

FROM: Cristina Self, Attorney– General Counsel Section
Office of General Counsel *CMS*

THROUGH: Lindil C. Fowler, General Counsel *LF*

DATE: August 5, 2014

SUBJECT: Proposed Amendment of 16 Tex. Admin. Code §3.9,
relating to Disposal Wells, and §3.46, relating to
Fluid Injection into Productive Reservoirs; Oil & Gas
Docket No. 20-0290951.

August 12, 2014		
Approved	Denied	Abstain
<i>[Handwritten signature]</i>		

Attached is Staff's recommendation to publish certain amendments to 16 Tex. Admin. Code §3.9, relating to Disposal Wells, and §3.46, relating to Fluid Injection into Productive Reservoirs.

Staff requests the Commission's approval to publish the proposed amendments in the *Texas Register* for a 30-day comment period. If approved at conference on August 12th, the proposal should appear in the August 29, 2014, issue of the *Texas Register*. This proposal and an online comment form would also be made available on the Commission's website the day after conference, giving interested persons more than two additional weeks to review and submit comments to the Commission.

cc: Jason Boatright, Director– General Counsel Section
Gil Bujano, Director – Oil & Gas Division
Craig Pearson, Seismologist – Executive Division
Milton Rister, Executive Director
Leslie Savage, Chief Geologist – Oil & Gas Division
Wei Wang, Chief Financial Officer

1 The Railroad Commission of Texas (Commission) proposes amendments to §§3.9 and 3.46,
2 relating to Disposal Wells, and Fluid Injection into Productive Reservoirs, to incorporate requirements
3 related to seismic events for disposal wells.

4 The United States Environmental Protection Agency estimates that there are 144,000 Class II
5 injection wells in the United States. The Commission has permitted over 50,000 Class II injection wells
6 in Texas since the 1930's. While few earthquakes have been documented over the past several decades
7 relative to the large number of disposal wells in operation, seismic events have infrequently occurred in
8 areas where there is coincident oil and gas activity. Therefore, the Commission proposes these rule
9 amendments in order to require additional permit application information such as logs, geologic cross-
10 sections, and/or structure maps, for an injection well in an area where conditions exist that may increase
11 the risk that fluids will not be confined to the injection interval. Such conditions may include, but are not
12 limited to, complex geology, proximity of the baserock to the injection interval, transmissive faults,
13 and/or a history of seismic events in the area as demonstrated by information available from the United
14 States Geological Survey (USGS). The Commission also proposes these amendments to clarify that it
15 has the authority to modify, suspend, or terminate a permit if fluids are not confined to the injection
16 interval.

17 The Commission proposes amendments to §3.9(3) to add new subparagraph (B) to state that the
18 applicant shall include with the application for a disposal well permit under this section the results of a
19 review of information from the USGS regarding the locations of any historical seismic events within the
20 estimated radius of the 10-year, five pounds per square inch (psi) pressure front boundary of the proposed
21 disposal well location. A pressure front is the zone of elevated pressure that is created by the injection of
22 fluids into the subsurface. A 10-year, five psi pressure front boundary is the boundary of increased
23 pressure of five psi after 10 years of injection at the maximum requested permit injection volume.

24 The USGS has the ability to detect and locate all seismic events larger than magnitude 2.0
25 throughout the continental United States. This ability makes the USGS the *de facto* source of seismic
26 event location in the United States. The USGS maintains an online, accessible data base of seismic

1 events in the United States from 1973 to the present. Applicants for a disposal well permit under §3.9 or
2 §3.46 as amended by this proposal would be required to access the USGS earthquake search tool at
3 <http://earthquake.usgs.gov/earthquakes/search/> in order to retrieve data regarding the locations of
4 historical seismic events within the estimated 10-year, five psi pressure front boundary. Figure 1 shows
5 an example with the following input values: (1) a start date and time of 1973-01-01 00:00:00; (2) a
6 minimum magnitude of 2; (3) the center latitude and center longitude of the proposed disposal well
7 location; and (4) an outside radius of 3.2 kilometers (two miles).

8 Figure 1: 16 TAC Chapter 3-- Preamble

9 The list and map result (after zooming in on the region of interest) as shown in Figure 2 will be
10 presented to the applicant for inclusion in the application.

11 Figure 2: 16 TAC Chapter 3-- Preamble

12 The Commission proposes new §3.9(3)(C) to state that the Commission may require an applicant
13 for a disposal well permit to provide the Commission with additional information, such as logs, geologic
14 cross-sections, and/or structure maps, to demonstrate that fluids will be confined if the well is to be
15 located in an area where conditions exist that may increase the risk that fluids will not be confined to the
16 injection interval. Conditions that may increase the risk that fluids will not be confined to the injection
17 interval may include, but are not limited to, complex geology, proximity of the baserock to the injection
18 interval, transmissive faults, and/or a history of seismic events in the area as demonstrated by information
19 available from the USGS required in §3.9(3)(B).

20 The Commission proposes to amend §3.9(6) to amend subparagraph (A) to include injection that
21 is suspected of or shown to be causing seismic activity to the list of reasons for which the Commission
22 may modify, suspend, or terminate a permit for saltwater or other oil and gas waste disposal for just
23 cause after notice and opportunity for hearing.

24 The Commission proposes to amend §3.9(11) to state that the Commission may require more
25 frequent monitoring and monitoring reporting to the Commission of the injection pressure and injection
26 rate. The Commission also proposes to amend §3.9(11)(B) to correct a typographical error in the existing

1 rule.

2 The Commission proposes to amend §3.46 to incorporate similar language for disposal wells that
3 are permitted under §3.46. Under §3.46, the Commission regulates injection into productive formations
4 for either enhanced recovery or for disposal. The new language relating to seismic activity would apply
5 only to those wells permitted under §3.46 for disposal purposes.

6 The Commission proposes to amend §3.46(b)(1) to add new subparagraphs (C) and (D).
7 Proposed new subparagraph (C) would require the applicant to include with the permit application for
8 injection for the purpose of disposal under this section the results of a review of information from the
9 USGS regarding the locations of any historical seismic events within the boundary of the 10-year, five
10 psi pressure front for the proposed disposal well location.

11 Proposed new §3.46(b)(1)(D) would state that the Commission may require an applicant for a
12 disposal well permit under this section to provide the Commission with additional information such as
13 logs, geologic cross-sections, and/or structure maps, to demonstrate that fluids will be confined if the
14 well is to be located in an area where conditions exist that may increase the risk that fluids will not be
15 confined to the injection interval. Such conditions may include, but are not limited to, complex geology,
16 proximity of the baserock to the injection interval, transmissive faults, and/or a history of seismic events
17 in the area as demonstrated by information available from the USGS required in §3.46(b)(1)(C).

18 The Commission proposes to add §3.46(d)(1)(F) to include injection that is suspected of or
19 shown to be causing seismic activity to the list of reasons for which the Commission may modify,
20 suspend, or terminate a permit for just cause after notice and opportunity for hearing.

21 The Commission proposes to amend §3.46(i)(1) and (2) to state that the Commission may require
22 more frequent monitoring and monitoring reporting to the Commission of the injection pressure and
23 injection rate.

24 Leslie Savage, Chief Geologist, Oil and Gas Division, has determined that for each year of the
25 first five years that the proposed amendments will be in effect, there will be no foreseeable implications
26 relating to cost or revenues of state governments or local governments as a result of enforcing or

1 administering the amendments. Commission staff responsible for permitting of disposal wells will
2 review information relating to historical seismic activity required to be submitted with each disposal well
3 application; however, these additional duties will be performed by existing personnel and within current
4 budget constraints, resulting in no additional costs to the agency.

5 Ms. Savage has determined that for each year of the first five years that the amendments will be
6 in effect, the public benefit will be the Commission's evaluation of information regarding seismic activity
7 within the area of a proposed or existing disposal well, and consideration of other factors related to the
8 prevention of pollution of surface and subsurface waters of the state and promotion of safety in
9 accordance with Texas Natural Resources Code, §§85.042 and 91.101.

10 The proposed rule amendments would include a new requirement that an applicant for a disposal
11 well determine the radius of the 10-year, five psi pressure front boundary from the proposed disposal
12 well location and use that radius to retrieve information from the USGS regarding the locations of any
13 historical seismic events within that radius. However, the applicant should already have the information
14 necessary to perform the pressure front calculations. Therefore, Ms. Savage estimates that the
15 performance of the pressure front calculation would cost approximately \$200. Once the 10-year, five psi
16 radius has been determined through calculation, Ms. Savage estimates that the cost of inputting the
17 information into the USGS website to retrieve seismic history, printing out that information, and
18 attaching the information to the application would be no more than \$100 for each application. The
19 proposed rule amendments also clarify that the Commission can require increased reporting of injection
20 volumes in certain very limited circumstances. Operators are already required to collect and maintain
21 this information under current regulations, however, and the cost of submitting this information to the
22 Commission on a more frequent basis is negligible. Therefore, Ms. Savage estimates that the probable
23 economic costs to persons required to comply with these proposed rule amendments for the first five
24 years they are in effect would be approximately an additional \$300 to the cost of each application for a
25 disposal well permit. The Commission notes that this requirement is only for disposal well permit
26 applications, not permit applications for wells to be used for the purpose of enhanced recovery.

1 Texas Government Code, §2006.002, relating to Adoption of Rules with Adverse Economic
2 Effect, requires that, before adopting a rule that may have an adverse economic effect on small
3 businesses or micro-businesses, a state agency prepare an economic impact statement and a regulatory
4 flexibility analysis. The economic impact statement must estimate the number of small businesses
5 subject to the proposed rule and project the economic impact of the rule on small businesses. A
6 regulatory flexibility analysis must include the agency's consideration of alternative methods of
7 achieving the purpose of the proposed rule. If consistent with the health, safety, and environmental and
8 economic welfare of the state, the analysis must consider the use of regulatory methods that will
9 accomplish the objectives of applicable rules while minimizing adverse impacts on small businesses.
10 The statute defines "small business" as a legal entity, including a corporation, partnership, or sole
11 proprietorship, that is formed for the purpose of making a profit; is independently owned and operated;
12 and has fewer than 100 employees or less than \$6 million in annual gross receipts. A "micro-business" is
13 a legal entity, including a corporation, partnership, or sole proprietorship, that is formed for the purpose
14 of making a profit; is independently owned and operated; and has no more than 20 employees.

15 Entities that perform activities under the jurisdiction of the Commission are not required to
16 report to the Commission their number of employees or their annual gross receipts, which are elements of
17 the definitions of "micro-business" and "small business" in Texas Government Code, §2006.001;
18 therefore, the Commission has no factual bases for determining whether any persons who drill and
19 complete wells under the jurisdiction of the Railroad Commission will be classified as small businesses
20 or micro-businesses, as those terms are defined. The North American Industrial Classification System
21 (NAICS) sets forth categories of business types. Operators of oil and gas wells fall within the category
22 for crude petroleum and natural gas extraction. This category is listed on the Texas Comptroller of Public
23 Accounts website page entitled "HB 3430 Reporting Requirements-Determining Potential Effects on
24 Small Businesses" as business type 2111 (Oil & Gas Extraction), for which there are listed 2,784
25 companies in Texas. This source further indicates that 2,582 companies (92.7%) are small businesses or
26 micro-businesses as defined in Texas Government Code, §2006.001. Any number of these businesses

1 could be affected under the proposed amendments.

2 Based on the information available to the Commission regarding oil and gas operators, Ms.
3 Savage has concluded that, of the businesses that could be affected by the proposed amendments, it is
4 likely that many would be classified as small businesses, and possible that some could be classified as
5 micro-businesses, as those terms are defined in Texas Government Code, §2006.001. The proposed
6 amendments would add requirements that may result in increased costs for applying for and operating a
7 disposal or injection well. Small and micro-businesses represent a large percentage of entities operating
8 in the crude oil and natural gas extraction industry. As such, the rule amendments are likely to affect a
9 significant number of small and micro-businesses. However, Ms. Savage anticipates that the adverse
10 impact to any one applicant (estimated to be approximately an additional \$300 for the cost of each
11 application for a disposal well permit, as described above) will be relatively small compared to the
12 overall costs associated with disposal well facilities and operating costs. Also, the Commission takes the
13 position that a prudent operator would perform pressure front calculations, which comprise the bulk of
14 the estimated costs of compliance, as part of its best management practices to ensure fluid confinement to
15 the permitted injection interval and ensure public safety. Moreover, the Commission has determined that,
16 because the purpose of the proposed amendments is to improve the safety of disposal well operations and
17 prevent pollution of surface and subsurface waters, it is not feasible to reduce any economic impact of
18 the rules on small or micro-businesses without compromising those efforts. Public safety and pollution
19 prevention are essential to the health, safety and environmental and economic welfare of the state,
20 regardless of whether the operator subject of this regulation is a large corporation, a small business, a
21 micro-business, or an individual. Because the Commission has determined that it is consistent with the
22 health, safety, and environmental and economic welfare of the state to have all persons engaged in the
23 operation of disposal well facilities conform to the same safety standards, the regulatory flexibility
24 analysis described in Texas Government Code §2006.002, is not required.

25 Pursuant to Texas Government Code, §2001.022, the Commission has determined that the
26 proposed amendments will not have an adverse impact on a local economy; therefore, the Commission

1 has not prepared a local employment impact statement as required under that statute. Further, the
2 Commission has determined that the proposed amendments do not meet the statutory definition of a
3 major environmental rule as set forth in Texas Government Code, §2001.0225; therefore, a regulatory
4 analysis pursuant to section is not required.

5 The Commission reviewed the proposed amendments and found that they are neither identified in
6 Coastal Coordination Act Implementation Rules, 31 TAC §505.11(b)(2) or (4), nor will they affect any
7 action or authorization identified in Coastal Coordination Act Implementation Rules, 31 TAC
8 §505.11(a)(6). Therefore, the proposed amendments are not subject to the Texas Coastal Management
9 Program.

10 Comments on the proposal may be submitted to Rules Coordinator, Office of General Counsel,
11 Railroad Commission of Texas, P.O. Box 12967, Austin, Texas 78711-2967; online at
12 www.rrc.state.tx.us/legal/rules/comment-form-for-proposed-rulemakings; or by electronic mail to
13 rulescoordinator@rrc.state.tx.us. Comments should refer to O&G Docket No. 20-0290951 and will be
14 accepted until 12:00 p.m. (noon) on Monday, September 29, 2014, which is 31 days after publication in
15 the *Texas Register*. The Commission finds that this comment period is reasonable because the proposal
16 as well as an online comment form will be available on the Commission's web site at least two weeks
17 prior to *Texas Register* publication of the proposal, giving interested persons additional time to review,
18 analyze, draft, and submit comments. The Commission encourages all interested persons to submit
19 comments no later than the deadline. The Commission cannot guarantee that comments submitted after
20 the deadline will be considered. For further information, call Ms. Savage at (512) 463-7308. The status
21 of Commission rulemakings in progress is available at www.rrc.state.tx.us/legal/rules/proposed-rules.

22 The Commission proposes amendments to §§3.9 and 3.46, pursuant to Texas Water Code,
23 §26.131, which gives the Commission jurisdiction over pollution of surface or subsurface waters from oil
24 and gas exploration, development, and production activities; Texas Water Code, Chapter 27, which
25 authorizes the Commission to adopt and enforce rules relating to injection wells; Texas Natural
26 Resources Code, §81.052, which authorizes the Commission to adopt all necessary rules for governing

1 and regulating persons and their operations under the jurisdiction of the Commission under Texas
2 Natural Resources Code, §81.051; Texas Natural Resources Code, §85.042(b), which provides the
3 Commission with the authority to, when necessary, make and enforce rules either general in their nature
4 or applicable to particular fields for the prevention of actual waste of oil or operations in the field
5 dangerous to life or property; Texas Natural Resources Code, §85.201, which authorizes the Commission
6 to make and enforce rules for the conservation of oil and gas and prevention of waste of oil and gas;
7 Texas Natural Resources Code, §85.202, which authorizes the Commission to adopt rules to prevent
8 waste of oil and gas in drilling and producing operations; Texas Natural Resources Code, §91.101,
9 which authorizes the Commission, in order to prevent pollution of surface water or subsurface water in
10 the state, to adopt rules relating to the various oilfield operations, including activities associated with the
11 drilling of injection water source wells which penetrate the base of useable quality water, and the
12 discharge, storage, handling, transportation, reclamation, or disposal of oil and gas waste; and Texas
13 Natural Resources Code §91.602, which authorizes the Commission, in order to protect human health
14 and the environment, to adopt and enforce rules relating to the generation, transportation, treatment,
15 storage, and disposal of oil and gas hazardous waste.

16 Texas Water Code, §26.131, and Chapter 27; and Texas Natural Resources Code, §§81.052,
17 85.042(b), 85.201, 85.202, 91.101, and 91.602 are affected by the proposed amendments.

18 Statutory authority: Texas Water Code, §26.131, and Chapter 27; and Texas Natural Resources
19 Code, §§81.052, 85.042(b), 85.201, 85.202, 91.101, and 91.602.

20 Cross-reference to statute: Texas Water Code, §26.131, and Chapter 27; and Texas Natural
21 Resources Code, §§81.052, 85.042(b), 85.201, 85.202, 91.101, and 91.602.

22
23 §3.9. Disposal Wells.

24 Any person who disposes of saltwater or other oil and gas waste by injection into a porous
25 formation not productive of oil, gas, or geothermal resources shall be responsible for complying with this
26 section, Texas Water Code, Chapter 27, and Title 3 of the Natural Resources Code.

1 (1) - (2) (No change.)

2 (3) Application.

3 (A) The application to dispose of saltwater or other oil and gas waste by
4 injection into a porous formation not productive of oil, gas, or geothermal resources shall be filed with
5 the commission in Austin accompanied by the prescribed fee. On the same date, one copy shall be filed
6 with the appropriate district office.

7 **(B) The applicant for a disposal well permit under this section shall include**
8 **with the permit application the results of a review of information from the United States**
9 **Geological Survey (USGS) regarding the locations of any historical seismic events within the**
10 **estimated radius of the 10-year, five pounds per square inch (psi) pressure front boundary of the**
11 **proposed disposal well location. The pressure front is the zone of elevated pressure that is created**
12 **by the injection of fluids into the subsurface.**

13 **(C) The commission may require an applicant for a disposal well permit**
14 **under this section to provide the commission with additional information such as logs, geologic**
15 **cross-sections, and/or structure maps, to demonstrate that fluids will be confined if the well is to be**
16 **located in an area where conditions exist that may increase the risk that fluids will not be confined**
17 **to the injection interval. Such conditions may include, but are not limited to, complex geology,**
18 **proximity of the baserock to the injection interval, transmissive faults, and/or a history of seismic**
19 **events in the area as demonstrated by information available from the USGS.**

20 (4) - (5) (No change.)

21 (6) Subsequent commission action.

22 (A) A permit for saltwater or other oil and gas waste disposal may be modified,
23 suspended, or terminated by the commission for just cause after notice and opportunity for hearing, if:

24 (i) a material change of conditions occurs in the operation or completion
25 of the disposal well, or there are material changes in the information originally furnished;

26 (ii) freshwater is likely to be polluted as a result of continued operation

1 of the well;

2 (iii) there are substantial violations of the terms and provisions of the
3 permit or of commission rules;

4 (iv) the applicant has misrepresented any material facts during the permit
5 issuance process;

6 (v) injected fluids are escaping from the permitted disposal zone; [or]

7 **(vi) injection is suspected of or shown to be causing seismic activity;**

8 **or**

9 **(vii) [(vi)] waste of oil, gas, or geothermal resources is occurring or is**
10 **likely to occur as a result of the permitted operations.**

11 (B) - (C) (No change.)

12 (7) - (10) (No change.)

13 (11) Monitoring and reporting.

14 (A) The operator shall monitor the injection pressure and injection rate of each
15 disposal well on at least a monthly basis, **or on a more frequent basis as required by the commission**
16 **under paragraph (3)(C) of this section.**

17 (B) The results of the monitoring shall be reported annually to the commission
18 on the prescribed **form, or on a more frequent basis as required by the commission under**
19 **paragraph (3)(C) of this section [from].**

20 (C) All monitoring records shall be retained by the operator for at least five
21 years.

22 (D) The operator shall report to the appropriate District Office within 24 hours
23 any significant pressure changes or other monitoring data indicating the presence of leaks in the well.

24 (12) - (14) (No change.)

25
26 §3.46. Fluid Injection into Productive Reservoirs.

1 (a) (No change.)

2 (b) Filing of application.

3 (1) Application.

4 (A) An application to conduct fluid injection operations in a reservoir
5 productive of oil, gas, or geothermal resources shall be filed in Austin on the form prescribed by the
6 commission accompanied by the prescribed fee. On the same date, one copy shall be filed with the
7 appropriate district office. The form shall be executed by a party having knowledge of the facts entered
8 on the form.

9 (B) The applicant shall file the freshwater injection data form if fresh water is to
10 be injected.

11 (C) The applicant for a disposal well permit under this section shall include
12 with the permit application the results of a review of information from the United States
13 Geological Survey (USGS) regarding the locations of any historical seismic events within the
14 estimated radius of the 10-year, five pounds per square inch (psi) pressure front boundary of the
15 proposed disposal well location. The pressure front is the zone of elevated pressure that is created
16 by the injection of fluids into the subsurface.

17 (D) The commission may require an applicant for a disposal well permit
18 under this section to provide the commission with additional information such as logs, geologic
19 cross-sections, and/or structure maps, to demonstrate that fluids will be confined if the well is to be
20 located in an area where conditions exist that may increase the risk that fluids will not be confined
21 to the injection interval. Such conditions may include, but are not limited to, complex geology,
22 proximity of the baserock to the injection interval, transmissive faults, and/or a history of seismic
23 events in the area as demonstrated by information available from the USGS.

24 (2) (No change.)

25 (c) (No change.)

26 (d) Subsequent commission action.

1 (1) An injection well permit may be modified, suspended, or terminated by the
2 commission for just cause after notice and opportunity for hearing, if:

3 (A) a material change of conditions occurs in the operation or completion of the
4 injection well, or there are material changes in the information originally furnished;

5 (B) fresh water is likely to be polluted as a result of continued operation of the
6 well;

7 (C) there are substantial violations of the terms and provisions of the permit or of
8 commission rules;

9 (D) the applicant has misrepresented any material facts during the permit
10 issuance process;

11 (E) injected fluids are escaping from the permitted injection zone; ~~or~~

12 **(F) for a disposal well permit under this section, injection is suspected of or**
13 **shown to be causing seismic activity; or**

14 **(G) [~~F~~]** waste of oil, gas, or geothermal resources is occurring or is likely to
15 occur as a result of the permitted operations.

16 (2) - (3) (No change.)

17 (e) - (h) (No change.)

18 (i) Monitoring and reporting.

19 (1) The operator shall monitor the injection pressure and injection rate of each injection
20 well on at least a monthly basis, **or on a more frequent basis for a disposal well permitted under this**
21 **section as required by the commission under subsection (b)(1)(D) of this section.**

22 (2) The results of the monitoring shall be reported annually, **or on a more frequent**
23 **basis for a disposal well permitted under this section as required by the commission under**
24 **subsection (b)(1)(D) of this section,** to the commission on the prescribed form.

25 (3) All monitoring records shall be retained by the operator for at least five years.

26 (4) The operator shall report to the appropriate District Office within 24 hours any

1 significant pressure changes or other monitoring data indicating the presence of leaks in the well.

2 (j) - (n) (No change.)


3 This agency hereby certifies that the proposal has been reviewed by legal counsel and found to
4 be within the agency's authority to adopt.

5 Issued in Austin, Texas on August 12, 2014.

6 Filed with the Office of the Secretary of State on August 12, 2014.

Cristina Martinez Self / Kom
Cristina Martinez Self
Rules Attorney, Office of General Counsel
Railroad Commission of Texas

Figure 1: 16 TAC Chapter 3--Preamble



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Earthquake Archive Search & URL Builder

Display results for 16 to 10,000 events

- [Help](#)
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Basic Search Options

DATE & TIME

<u>Start (UTC)</u>	<u>End (UTC)</u>
1900-07-30 00:00:00	2014-08-06 23:59:59

MAGNITUDE

<u>Minimum</u>	<u>Maximum</u>
2	

GEOGRAPHIC REGION

Currently displaying a bounding box of Center Region

Rectangle

Defines the West, East, North, and South coordinates of the bounding box.

North	
West	East
	South

Circle

<u>Center Latitude</u>	<u>Center Longitude</u>
NaN	-97.5759608
<u>Inside Radius (km)</u>	<u>Outside Radius (km)</u>
	3.2

Advanced Search Options

DEPTH (KM)

<u>Minimum</u>	<u>Maximum</u>

AZIMUTHAL GAP

<u>Minimum</u>	<u>Maximum</u>

REVIEW STATUS

Any

Automatic

Reviewed

EVENT TYPE

IMPACT (PAGER, SHAKEMAP, CYPIS)

CATALOG

CONTRIBUTOR

PRODUCT TYPE

Output Options

FORMAT

Map & List

CSV

KML

QuakeML

GeoJSON

ORDER BY

Time - Newest First

Time - Oldest First

Magnitude - Largest First

Magnitude - Smallest First

LIMIT RESULTS

<u>Number of Events</u>	<u>Offset</u>

Search

Output Format: Map & List

Figure 2: 16 TAC Chapter 3--Preamble

