



Department of Energy

Washington, DC 20585

January 15, 2010

Mr. Lawrence M. Brede
Deputy Project Manager
EnergySolutions Federal Services
2021 N. Highway 191
Moab, Utah 84532

Dear Mr. Brede:

This is in response to your request for an exemption from certain provisions contained in title 10, Code of Federal Regulations, part 835 (10 C.F.R. 835), "Occupational Radiation Protection," which was received from the Office of Environmental Management on October 13, 2009. Specifically, you have requested an exemption from the provisions of 10 C.F.R. 835, sections 835.1(b)(5), 835.2(a), 835.4, 835.202(c), 835.402(c)(1), and 835.403(a)(1). The purpose of the exemption request is to obtain relief from inherent problems in conducting dose assessments; performing air monitoring; and performing personal monitoring for radon, thoron, and their progeny. As you noted, the Department of Energy (DOE) has previously granted similar exemptions to other DOE contractors – most recently the S.M. Stoller Corporation in March 2004.

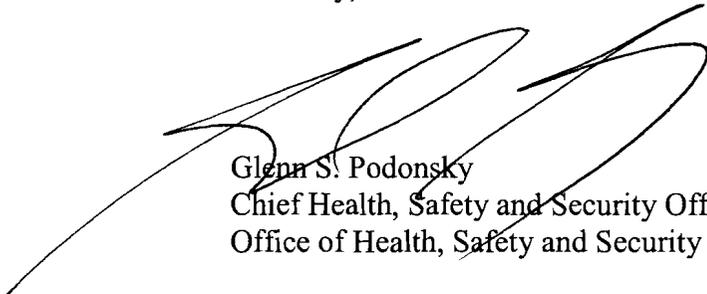
The Office of Worker Safety and Health Policy, within the Office of Health, Safety and Security, conducted a technical review (enclosure 1) of the exemption request. Based on this review of the information that was provided, I:

- Grant, with conditions, an exemption from the following provisions of 10 C.F.R. 835: sections 835.2(a) (definitions of background and radiological worker), 835.402(c)(1), 835.403(a)(1), and 835.602(a). The conditions associated with this exemption are specified in the accompanying Exemption Decision (enclosure 2). Granting this exemption will provide EnergySolutions with the requested relief from the inherent problems in conducting dose assessments; performing air monitoring; and performing personal monitoring for radon, thoron, and their progeny.



- Deny the request for exemption from the provisions of 10 C.F.R. 835 at sections 835.1(b)(5), 835.2(a) (definitions of airborne radioactivity area, occupational dose, and controlled area), and 835.4 because relief from these provisions of 10 C.F.R. 835 is not needed to meet the intent of the exemption request.

Sincerely,



Glenn S. Podonsky
Chief Health, Safety and Security Officer
Office of Health, Safety and Security

Enclosures

cc w/enclosures:

Ines R. Triay, EM-1

Dae E. Chung, EM-2

Steven L. Krahn, EM-21

Chuan-Fu Wu, EM-21

James A. Poppiti, EM-21

Donald R. Metzler, Moab Federal Project Office

Docketing Clerk, HS-40

Radiological Control

Coordinating Committee

TECHNICAL REVIEW
EnergySolutions
Title 10, Code of Federal Regulations, Part 835
Exemption Request

EnergySolutions submitted a request for relief from certain requirements contained in title 10, Code of Federal Regulations, part 835 (10 C.F.R. 835), "Occupational Radiation Protection," as they pertain to the assessment, monitoring, and record keeping associated with occupational exposure to radon, thoron, and their progeny. The following discussion describes the rationale used to determine the disposition of this request for exemption. *Note that hereafter the term "radon" will refer to "radon, thoron, and their progeny" unless otherwise noted.*

Discussion of Exemption Request

General

Specifically, EnergySolutions requested an exemption from the following provisions of 10 C.F.R. 835: sections 835.1(b)(5); 835.2(a) (definitions of airborne radioactive material area, controlled area, occupational dose, radiological worker); 835.4; 835.202(c); 835.402(c)(1); and 835.403(a)(1). The purpose of the exemption request is to obtain relief from inherent problems in conducting dose assessments, performing air monitoring, and performing personal monitoring for radon.

Requirements from which exemption is sought

- *Section 835.1 Scope*
 - (b) Exclusion. Except as provided in paragraph (c) of this section, the requirements in this part do not apply to: *****
 - (5) Background radiation, radiation doses received as a patient for the purposes of medical diagnosis or therapy, or radiation doses received from participation as a subject in medical research programs; or
- *Section 835.2 Definitions*
 - (a) As used in this part:
 - Airborne radioactivity area means any area, accessible to individuals, where:
 - (1) The concentration of airborne radioactivity, above natural background, exceeds or is likely to exceed the derived air concentration (DAC) values listed in appendix A or appendix C of this part; or (2) An individual present in the area without respiratory protection could receive an intake exceeding 12 DAC-hours in a week.

Controlled area means any area to which access is managed by, or for, DOE to protect individuals from exposure to radiation and/or radioactive material.

Occupational dose means an individual's ionizing radiation dose (external and internal) as a result of that individual's work assignment. Occupational dose does not include doses received as a medical patient or doses resulting from background radiation or participation as a subject in medical research programs.

Radiological worker means a general employee whose job assignment involves operation of radiation-producing devices or working with radioactive materials, or who is likely to be routinely, occupationally exposed above 0.1 rem (0.001 Sv) per year total effective dose.

- *Section 835.4 Radiological Units*
Unless otherwise specified, the quantities used in the records required by this part shall be clearly indicated in special units of curie, rad, roentgen, or rem, including multiples and subdivisions of these units, or other conventional units, such as dpm, dpm/100 cm², or mass units. The SI units, becquerel (Bq), gray (Gy), and sievert (Sv) may be provided parenthetically for reference with scientific standards.
- *Section 835.202 Occupational Dose Limits for General Employees*
 - (c) Doses from background, therapeutic and diagnostic medical radiation, and participation as a subject in medical research programs shall not be included in dose records or in the assessment of compliance with the occupational dose limits.
- *Section 835.402 Individual Monitoring*
 - (c) For the purpose of monitoring individual exposures to internal radiation, internal dosimetry programs (including routine bioassay programs) shall be conducted for:
 - (1) Radiological workers who, under typical conditions, are likely to receive a committed effective dose of 0.1 rem (0.001 Sv) or more from all occupational radionuclide intakes in a year;
- *Section 835.403 Air Monitoring*
 - (a) Monitoring of airborne radioactivity shall be performed:
 - (1) Where an individual is likely to receive an exposure of 40 or more DAC-hours in a year; or

The following provisions are also addressed in this technical review although not included in EnergySolutions' exemption request.

- *Section 835.2 Definitions*
 - (a) As used in this part:
 - Background means radiation from:
 - (1) Naturally occurring radioactive materials which have not been technologically enhanced;
 - (2) Cosmic sources;

- (3) Global fallout as it exists in the environment (such as from the testing of nuclear explosive devices);
 - (4) Radon and its progeny in concentrations or levels existing in buildings or the environment, which have not been elevated as a result of current or prior activities; and
 - (5) Consumer products containing nominal amounts of radioactive material or producing nominal amounts of radiation.
- *Section 835.602 Controlled areas*
 - (a) Each access point to a controlled area (as defined in section 835.2) shall be posted whenever radiological areas or radioactive material areas exist in the area. Individuals who enter only controlled areas without entering radiological areas or radioactive material areas are not expected to receive a total effective dose of more than 0.1 rem (0.001 sievert) in a year.

Results of Analysis

Discussion

Radon presents unique problems associated with occupational radiation protection. One of these problems is that, unlike most other occupational exposures received while conducting DOE activities, radon is present in the natural background. The concentrations of radon occurring in background vary with a variety of environmental factors, the time of day, and the time of year. This creates technical difficulties in differentiating occupational exposure from background exposure at sites where radon is present due to current or previous DOE activities.

EnergySolutions stated that their exemption request was intended to resolve two problems with the determination of occupational exposure to radon, thoron, and their progeny. The first problem involves the technical difficulties in differentiating between background and occupational exposure to radon and/or thoron and their progeny. The second problem involved the use of the defined term working level (10 C.F.R. 835 appendix A, footnote 5) as the basis for dosimetric conversion for recording of individual occupational dose.

With regard to the technical difficulties in differentiating between background and occupational exposure to radon, *EnergySolutions* proposed to resolve this problem by including background contributions within occupational exposure and increasing the thresholds in 10 C.F.R. 835 for monitoring internal dose and for sampling airborne radioactivity. To achieve this goal they proposed the following approach:

- To permit the background exposure to be included in the determination of occupational exposure to radon, thoron, and their progeny *EnergySolutions* requested regulatory relief from section 835.1(b)(5), which excludes background radiation from 10 C.F.R. 835, and section 835.202(c), which excludes dose from background

radiation from being included in dose records or in the assessment of compliance with the occupational dose limits.

- To increase the threshold for monitoring of internal exposure, *EnergySolutions* requested relief from section 835.402(c)(1) and proposed to use a threshold of 500 mrem in a year instead of 100 mrem in a year.
- To increase the threshold for monitoring of airborne radioactivity, *EnergySolutions* requested relief from section 835.403(a)(1) and proposed to use a threshold of 200 DAC-hours in a year instead of 40 DAC-hours in a year.
- For consistency with the changes to the provisions of 10 C.F.R. 835 specified above, *EnergySolutions* proposed conforming changes to the definitions of airborne radioactivity area, controlled area, occupational dose, and radiological worker.
- To permit the use of the term working level (WL) as the unit of radon and thoron airborne concentration and for assessing dose, *EnergySolutions* requested relief from section 835.4, the provision that specifies the radiological units required by 10 C.F.R. 835.

Recommendations

Relief from monitoring requirements should be provided. This is in recognition of a technology shortfall of current instrumentation and monitoring techniques in being able to distinguish background levels of radon from levels created as a result of DOE activities.

The Office of Worker Safety and Health Policy believes that an appropriate approach would be to raise the monitoring threshold and require that all exposure above the adjusted monitoring threshold from radon received as a result of the employee's work assignment in a controlled area be assessed as an occupational exposure.

As proposed by *EnergySolutions*, the issue would best be addressed for radiological workers by (1) including background contributions from exposure to radon, thoron, and their progeny in occupational dose while in a controlled area; and (2) changing appropriate monitoring thresholds contained in 10 C.F.R. 835 from 100 mrem to 500 mrem committed effective dose (CED).

To achieve this objective, the Office of Worker Safety and Health Policy will use a similar response to that provided to Babcock and Wilcox Technologies of Ohio, Inc., in response to an exemption request concerned with monitoring of exposure to radon and its decay products. This approach will result in fewer changes to the *EnergySolutions*' existing Radiation Protection Program (RPP) while providing the regulatory relief requested by *EnergySolutions* to effectively and practically monitor occupational exposure to radon. Basically, this approach would be to:

- Redefine the definition of “background” to delete radon (10 C.F.R. 835.2(a)) in a controlled area.
- Revise monitoring thresholds for radiological workers’ internal exposure, air monitoring (sections 835.2(a), 835.402(c)(1), and 835.403(a)), and the dose expectation for individuals in a controlled area who do not enter other posted areas (section 835.602(a)). The 0.5 rem monitoring threshold for radiological workers’ internal exposure should include all contributions from sources of radon, including background, while in a controlled area.

The following exemptions should be granted for the following reasons (revised text for inclusion in the site RPP is listed in bold and italics):

1. Revising the definition of background [section 835.2(a)]:

Due to the diurnal, geographic, and seasonal variations in background levels of radon, differentiating occupational exposure from background exposure at the current monitoring threshold of 0.1 rem in a year is impractical in locations with technology enhanced concentrations of radon. Accordingly, for the purpose of determining occupational dose of individuals from radon while in a controlled area, the monitoring threshold for occupational exposure to radon would be raised to 0.5 rem in a year. All exposure to radon while in a controlled area at the site would be included in individual occupational exposure monitoring results. To achieve this goal, the definition of “background” would be modified so that any radiation resulting from radon, thoron, and its progeny in a controlled area would not be defined as background radiation.

Recommended revised text for RPP:

Background means radiation from (1) Naturally occurring radioactive materials which have not been technologically enhanced; (2) Cosmic sources; (3) Global fallout as it exists in the environment (such as from the testing of nuclear explosive devices); (4) Radon, thoron, and their progeny, *located outside of a controlled area*, in concentrations or levels existing in buildings or the environment, which have not been elevated as a result of current or prior activities; and (5) Consumer products containing nominal amounts of radioactive material or producing nominal amounts of radiation.

Note: The effect of revising the definition of background is that *EnergySolutions* would not need an exemption, as requested, from the following provisions:

- Section 835.1(b)(5), exclusion of background levels of radon in controlled areas;
- Section 835.2(a), definition of airborne radioactivity area;
- Section 835.2(a), definition of occupational dose; and
- Section 835.202(c), exclusion of doses from background in dose records or in the assessment of compliance with the occupational dose limits.

2. Revising the definition of radiological worker [Section 835.2(a)]:

The definition of a radiological worker would be modified to be consistent with the modification of the monitoring threshold for radiological workers.

Recommended revised text for RPP:

Radiological worker means a general employee whose job assignment involves operation of radiation-producing devices, or working with radioactive materials, or who is likely to be routinely occupationally exposed above 0.1 rem (0.001 sievert) per year total effective dose *from sources other than occupational exposure to radon, thoron, and their progeny. In the case of occupational exposures to radon, thoron, and their progeny, a radiological worker means a general employee whose routine occupational exposure, while in a controlled area, is likely to exceed 0.5 rem (0.005 sievert) per year committed effective dose from radon, thoron, and their progeny.*

3. Raising the monitoring threshold of radiological workers occupationally exposed to radon [section 835.402(c)(1)]:

Consistent with the discussion regarding technical difficulties associated with differentiating occupational exposure from background levels of radon, the threshold for monitoring radiological workers' exposure to radon would be raised to 500 mrem CED. This is consistent with monitoring thresholds under U.S. Nuclear Regulatory Commission radiation protection regulations (10 C.F.R.20.1502 (a)). The revised definition of "background" requires that this threshold includes all exposure to radon in a controlled area.

The 0.5 rem CED monitoring threshold for radiological workers' exposure to radon in a controlled area would be independent of the 0.1 rem CED threshold for all other radionuclides. Therefore, if the radiological worker is exposed to radon and other radionuclides during the year, the 0.5 rem CED monitoring threshold would apply only to radon and the remaining radionuclides would still have a 0.1 mrem CED monitoring threshold.

Recommended revised text for RPP:

For the purpose of monitoring individual exposures to internal radiation, internal dose evaluation programs (including routine bioassay programs) shall be conducted for:

(1) Radiological workers who, under typical conditions, are likely to receive a committed effective dose equivalent of:

- ((i) **0.5 rem (0.005 Sv) or more from all occupational intakes of radon while in a controlled area.**)
- (ii) 0.1 rem (0.0001 Sv) or more from all occupational radionuclide intakes in a year.

EnergySolutions must document in its RPP its evaluation that no unmonitored individual at the site, outside of controlled areas, would be likely to receive an occupational dose from radon exceeding the monitoring thresholds of 10 C.F.R. 835, subpart E. The evaluation should address exposures outside of controlled areas resulting from radon enhanced from DOE activities migrating from controlled areas. It must also address the adequacy of site characterization to properly locate and quantify sources of radon outside of controlled areas that were enhanced from DOE activities.

4. Raising the air monitoring threshold [section 835.403(a)]:

Consistent with the internal dose monitoring threshold, the air monitoring threshold for radon would be raised from 40 or more DAC-hours in a year to 200 or more DAC-hours in a year for occupational exposure to radon at the Mound site. These levels correlate with raising the threshold from 100 mrem to 500 mrem CED. The 200 DAC-hour air monitoring threshold for exposures to radon would be independent of the air monitoring threshold for all other radionuclides. Therefore, if a mixture of radon and other airborne radionuclides existed, the radon air monitoring threshold would apply separately. The remaining mixture would continue to have its 40 DAC-hour monitoring threshold.

Recommended revised text for RPP:

Monitoring of airborne radiation shall be performed:

(1) When an individual is likely to receive an exposure of 40 or more DAC-hours in a year *or 200 or more DAC-hours in a year from occupational exposure to radon while (in a controlled area)*;

The above four changes would not affect the exposure limits and monitoring thresholds for minors and members of the public in controlled areas.

5. Changing the dose expectation for individuals in a controlled area who do not enter a posted area. [(section 835.602(a)]

For completeness, the dose expectation that individuals who enter only controlled areas without entering radiological areas or radioactive material areas are not expected to receive a total effective dose of more than 0.1 rem (0.001 sievert) in a year should be changed for consistency with the proposed monitoring threshold of 0.5 rem total effective dose (TED) in a year associated with radon.

Recommended revised text for RPP:

Controlled areas.

(a) Each access point to a controlled area (as defined in section 835.2) shall be posted whenever radiological areas or radioactive material areas exist in the area. Individuals who enter only controlled areas without entering radiological areas or radioactive material areas are not expected to receive a TED of more than 0.1 rem (0.001Sv) in a year *from sources other than occupational exposure to radon, thoron, and their progeny. Individuals who enter only controlled areas without entering radiological areas or radioactive material areas are not expected to receive a TED of more than 0.5 rem (0.005 Sv) in a year from exposure to radon, thoron, and their progeny.*

Exemptions Denied:

Exemptions for sections 835.1(b)(5), 835.2(a) (definitions of airborne radioactivity area, controlled area, and occupational dose), 835.4, and 835.202(c) are denied.

- As noted above, the recommended change to the definition of the term background in section 835.2(a) to exclude any radiation emitted by radon, thoron, and their progeny in a controlled area, eliminated the necessity for the following proposed exemptions:
 - Section 835.1(b)(5), exclusion of background levels of radon in controlled areas;
 - Section 835.2(a), definition of airborne radioactivity area;
 - Section 835.2(a), definition of occupational dose; and
 - Section 835.202(c), exclusion of doses from background in dose records or in the assessment of compliance with the occupational dose limits.
- The recommended exemption to section 835.602(a) eliminated the need for an exemption to the section 835.2(a) definition of controlled area.
- The proposed exemption to section 835.4 is not needed for the following reasons. This provision was revised in the recent amendment to 10 C.F.R. 835 to provide additional flexibility in the choice of units used to indicate the magnitude of the quantities for which units are required by 10 C.F.R. 835. Although units such as dpm, dpm/cm², and mass units were listed in section 835.4, this listing was preceded by the term “such as” to indicate that other unlisted units are permitted. Accordingly, it is acceptable to use working level (WL) and working level month (WLM) as appropriate to comply with the record-keeping requirements in subpart H of 10 C.F.R. 835; note that footnote 5 to 10 C.F.R. 835, appendix D, states that DAC values may be replaced by WLs. Therefore, the request for exemption from section 835.4 is not needed.

Note that when converting from WLM to rem in order to include assigned internal doses from radon, thoron, and their progeny in the determination of TED and committed equivalent dose, the conversion factors must be based on the revised DACs for radon and thoron in the latest version of 10 C.F.R. 835.

Conclusion

The above exemptions meet the criteria for granting a permanent exemption under 10 C.F.R. 820.62:

1. Granting these exemptions would be authorized by law.
2. These exemptions would not present an undue risk to public health and safety, the environment, or facility workers.
3. The exemptions would be consistent with the safe operation of a DOE nuclear facility.
4. In granting these exemptions pursuant to 10 C.F.R.820.62 (d)(2), DOE recognizes that special circumstances exist where the application of the requirements discussed above would not serve or is not necessary to achieve its underlying purpose or would result in resource impacts, which are not justified by the safety improvements.

EXEMPTION DECISION

Pursuant to title 10, Code of Federal Regulations, part 820.61 (10 C.F.R. 820.61), the Chief Health, Safety and Security Officer is authorized to exercise authority on behalf of the Department of Energy (DOE) with respect to requests for exemptions from nuclear safety rules relating to radiological protection of workers, the public, and the environment.

The Moab Uranium Mill Tailings Remediation Act contractor *EnergySolutions* filed a request with the Department for an exemption from certain provisions of 10 C.F.R. 835, "Occupational Radiation Protection." Specifically, *EnergySolutions* requested an exemption from the following provisions of 10 C.F.R. 835: sections 835.1(b)(5), 835.2(a), 835.4, 835.202(c), 835.402(c)(1), and 835.403(a)(1). The purpose of the exemption request is to obtain relief from inherent problems in conducting dose assessments; performing air monitoring; and performing personal monitoring for radon, thoron, and their progeny. *EnergySolutions* stated that the requested exemption is not prohibited by law; will not present an undue risk to the public health and safety, the environment, or facility workers; and is consistent with the safe operation of a DOE nuclear facility. In addition, *EnergySolutions* stated that the exemption request meets one of the special circumstances specified in 10 C.F.R. 820.62(d). Specifically, "*Application of the requirement in the particular circumstances would not serve or is not necessary to achieve its underlying purpose, or would result in resource impacts which are not justified by the safety improvements.*"

Based on a review of the supporting documentation, I have made the following determinations:

Approved/Granted Exemptions and Conditions:

I approve, with the conditions listed below and on a permanent basis, *EnergySolutions*' request for exemption, from the provisions of 10 C.F.R. 835 specified at, sections 835.2(a) (definition of radiation worker), 835.402(c)(1), and 835.403(a)(1). I also grant *EnergySolutions* an exemption with conditions from section 835.2(a) (definition of background) and section 835.602(a).

Conditions:

1. Except as specified in this exemption decision, *EnergySolutions* shall comply with the provisions contained in the version of 10 C.F.R. 835 published in the Federal Register on June 8, 2007, for the purposes of occupational protection from exposure to radon, thoron, and their progeny; and

2. EnergySolutions shall revise its Radiation Protection Program as follows:

Original Text	Revised Text (changes highlighted)
<p>Section 835.403(a) Monitoring of airborne radioactivity shall be performed: (1) Where an individual is likely to receive an exposure of 40 or more DAC-hours in a year;</p>	<p>Section 835.403(a) Monitoring of airborne radioactivity shall be performed: (1) Where an individual is likely to receive an exposure of 40 or more DAC-hours in a year; <i>or 200 or more DAC-hours in a year from occupational exposure to radon, thoron, and their progeny while in a controlled area;</i></p>
<p>Section 835.602(a) Each access point to a controlled area (as defined in section 835.2) shall be posted whenever radiological areas or radioactive material areas exist in the area. Individuals who enter only controlled areas without entering radiological areas or radioactive material areas are not expected to receive a total effective dose of more than 0.1 rem (0.001sievert) in a year.</p>	<p>Section 835.602(a) Each access point to a controlled area (as defined in section 835.2) shall be posted whenever radiological areas or radioactive material areas exist in the area. Individuals who enter only controlled areas without entering radiological areas or radioactive material areas are not expected to receive a total effective dose of more than 0.1 rem (0.001sievert) in a year <i>from sources other than occupational exposure to radon, thoron, and their progeny. Individuals who enter only controlled areas without entering radiological areas or radioactive material areas are not expected to receive a total effective dose of more than 0.5 rem (0.005sievert) in a year from exposure to radon, thoron, and their progeny.</i></p>

3. This 0.500 rem committed effective dose threshold is exclusive to radiological workers exposure to radon and/or thoron and their progeny and is completely independent of the 0.100 rem committed effective dose monitoring threshold for all other radionuclides.

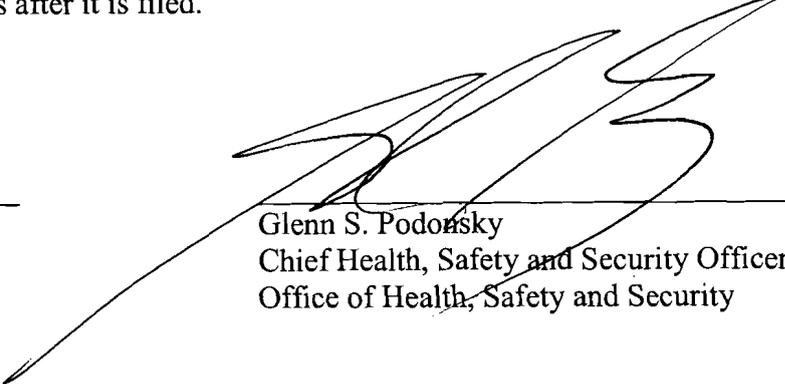
Denied Exemptions:

I do not approve the request for an exemption from the provisions of 10 C.F.R. 835 specified at sections 835.1(b)(5), 835.2(a) (definitions of airborne radioactivity area, occupational dose, and controlled area), and 835.4.

Pursuant to 10 C.F.R. 820.61, EnergySolutions has 15 days from the date of the filing of this Decision to file a Request to Review with this office. The Request to Review shall state, specifically, the respects in which the exemption determination is claimed to be erroneous, the grounds of the request, and the relief requested. If no Request to Review is submitted, the exemption becomes a Final Order 15 days after it is filed.

1/15/10

Date



Glenn S. Podonsky
Chief Health, Safety and Security Officer
Office of Health, Safety and Security