



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT 03 2008

OFFICE OF
AIR AND RADIATION

Mr. H. Dale Hall
Director
U.S. Fish and Wildlife Service
1849 C Street, NW
Washington, DC 20240

Mr. James Lecky
Director, Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway, 13th Floor
Silver Spring, MD 20910

Dear Messrs. Hall and Lecky:

Re: Endangered Species Act and GHG Emitting Activities

The U.S. Environmental Protection Agency is currently evaluating several permits under the Clean Air Act for activities that emit various air pollutants, including carbon dioxide (CO₂) and other greenhouse gases (GHG).¹ Public comments on draft permits and the environmental impact statements for related approvals have alleged that authorization of GHG-emitting activities requires that EPA and various lead federal agencies address certain species in consultations with the relevant wildlife Services under section 7(a)(2) of the Endangered Species Act (ESA) due to possible impacts of the GHG emissions from these activities. This letter seeks to confirm your agreement with EPA's determination, based on the following analyses, that issuance of permits under the Clean Air Act for activities that emit GHGs in amounts equal to or less than those analyzed below does not require consultation with NOAA Fisheries or the U.S. Fish and Wildlife Service (FWS) under section 7(a)(2) of the ESA to address the remote potential risks that public commenters suggest GHG emissions from an individual source could present for certain listed species.

¹ These permits are in various stages of the review process within the Agency, including administrative appeals before the Agency's Environmental Appeals Board that delay the effective date of and final agency action on the permit (and thus preclude the construction authorized by the permit) until the EAB completes its review. 40 U.S.C. § 124.15(b)(2), 124.19(f). In addition, EPA has included conditions in some permits that prohibit construction of the facility until EPA notifies the permittee that EPA has fulfilled any ESA obligations. The conditions also explicitly retain authority for EPA to ensure that the permit applications or terms are amended as appropriate to address any issues regarding the protection of listed species that may be identified.

Background regarding ESA Section 7(a)(2) and GHGs

Section 7(a)(2) of the ESA requires federal agencies, in consultation with NOAA Fisheries and/or the FWS (the Services), to ensure that actions they authorize, fund or carry out are not likely to jeopardize the continued existence of federally-listed threatened or endangered species, or result in the destruction or adverse modification of designated critical habitat of such species. 16 U.S.C. § 1536(a)(2). Under relevant implementing regulations, consultation is required only for actions that “may affect” listed species or critical habitat that are present in the action area of the proposed action. 50 C.F.R. § 402.14. Consultation is not required where the action has “no effect” on such listed species or critical habitat. The effects of the action are defined by regulation to include both the direct and indirect effects on species or critical habitat. 50 C.F.R. § 402.02. Indirect effects are those that are caused by the action and are later in time, but still are reasonably certain to occur. *Id.*; see also 51 Fed. Reg. 19926, 19932-33 (June 3, 1986) (discussing “reasonably certain to occur” in the context of cumulative effects analysis and noting that only matters that are likely to occur – and not speculative matters – are included within the standard).

Neither the ESA, nor the implementing regulations at 50 C.F.R. Part 402, require a federal agency to obtain the Services’ agreement on a determination that the agency’s action does not trigger the consultation requirements of section 7(a)(2). By seeking the Services’ agreement with our determination on this matter, we do not intend to create any new process for EPA’s compliance with section 7(a)(2) or to otherwise establish new interagency coordination procedures where consultation is not required. However, given the relative novelty of issues relating to GHG emissions from facilities permitted under EPA’s Clean Air Act authorities and certain listed species, we are seeking to confirm that our agencies’ respective understandings of relevant ESA obligations are consistent.

EPA is aware, for instance, that NOAA Fisheries has jurisdiction over two species of coral (elkhorn and staghorn) present in the Caribbean that are listed as threatened under the ESA. 71 Fed. Reg. 26852 (May 9, 2006). EPA understands that NOAA Fisheries has identified elevated sea surface temperature and increased CO₂ concentrations as stresses on the listed coral species. *Id.* at 26854-59. We note, however, that these species are not located in or near the area of the activities covered by permits under review at EPA.

EPA is also aware that the FWS has jurisdiction over polar bears present in Arctic regions that are listed as threatened under the ESA. 73 Fed. Reg. 28212 (May 15, 2008). EPA is currently considering one permitting action for activities in the Arctic, but the polar bear is not located in or near the area of the majority of the activities covered by permits under review at EPA. Nevertheless, EPA understands that FWS has identified loss of sea ice habitat due to rising global temperatures as a stress on the listed polar bear species. *Id.* at 28225-26.

FWS and NOAA Fisheries share responsibility for implementing the ESA. Accordingly, these agencies have primary expertise regarding, and familiarity with, the requirements of the ESA.

Polar Bear Listing

FWS recently considered the issue of GHG emissions from a single source and the triggering of ESA Section 7(a)(2) requirements.

In the context of the final listing of the polar bear as a threatened species under the ESA, FWS determined, with supporting analysis provided by the U.S. Geological Survey, that the best currently available scientific data do not support drawing a causal connection between GHG emissions from a particular facility and effects on listed species or their habitats, for ESA purposes. In addition, FWS explained that it does not believe there is sufficient data to establish that such impacts are reasonably certain to occur, for ESA purposes. Based on these determinations, FWS concluded that action agencies need not consult with respect to any such impacts.²

As FWS explained in the final polar bear listing:

Formal consultation is required for proposed Federal actions that “may affect” a listed species, which requires an examination of whether the direct and indirect effects of a particular action meet this regulatory threshold. GHGs that are projected to be emitted from a facility would not, in and of themselves, trigger formal section 7 consultation for a particular licensure action unless it is established that such emissions constitute an “indirect effect” of the proposed action. To constitute an “indirect effect,” the impact to the species must be later in time, must be caused by the proposed action, and must be “reasonably certain to occur” [T]he best scientific data available today are not sufficient to draw a causal connection between GHG emissions from a facility in the conterminous 48 States to effects posted to polar bears or their habitat in the Arctic, nor are there sufficient data to establish that such impacts are “reasonably certain to occur” to polar bears. Without sufficient data to establish the required causal connection – to the level of “reasonable certainty” – between a new facility’s GHG emissions and impacts to polar bears, section 7 consultation would not be required to address impacts to polar bears.

73 Fed. Reg. at 28300.

Additionally, the U.S. Department of the Interior today is issuing a Solicitor’s Opinion in which it details why proposed actions that involve the emission of GHGs would not meet the “may affect” threshold set forth in the ESA regulations and therefore would not trigger the consultation requirements under section 7(a)(2) of the ESA. The Opinion explains that, for purposes of the ESA “may affect” test, neither direct effects nor indirect effects result from the GHG emissions from a single source. Citing to the U.S. Geological Survey’s analysis and its continuing validity, the Opinion concludes that where the effect at issue is climate change in the

² See Memorandum from H. Dale Hall, Director, U.S. Fish and Wildlife Service re: “Expectations for Consultation on Actions that Would Emit Greenhouse Gases” (May 14, 2008); Memorandum from Mark D. Myers, Director, U.S. Geological Survey re: “The Challenges of Linking Carbon Emissions, Atmospheric Greenhouse Gas Concentrations, Global Warming, and Consequential Impacts” (May 14, 2008).

form of increased temperatures, proposed actions that involve the emission of GHGs cannot pass the “may affect” test and therefore are not subject to ESA consultation.

Accordingly, given the statements by FWS in the polar bear listing and by the DOI Solicitor, EPA believes the FWS would conclude that consultations with FWS under ESA section 7(a)(2) are not required to address the possible impacts of the GHG emissions from the permit activities pending before the EPA.

Modeling Analysis

As an additional basis for considering its ESA section 7(a)(2) obligations, EPA has analyzed whether the GHG emissions from a single source could be modeled to determine whether the risk of harm to any listed species – including the listed corals or polar bears, or to the habitat of such species – from the anticipated emissions of that single source would trigger ESA section 7(a)(2) consultation. As explained below, this additional analysis supports the same conclusion reached by FWS: consultation under ESA section 7(a)(2) would not be required based on GHG emissions from a single source authorized by EPA.

To date, research on how emissions of CO₂ and other GHGs influence global climate change and associated effects has focused on the overall impact of emissions from aggregate regional or global sources. This is primarily because GHG emissions from single sources are small relative to aggregate emissions, and GHGs, once emitted from a given source, become well mixed in the global atmosphere and have a long atmospheric lifetime. The climate change research community has not yet developed tools specifically intended for evaluating or quantifying end-point impacts attributable to the emissions of GHGs from a single source, and we are not aware of any scientific literature to draw from regarding the climate effects of individual, facility-level GHG emissions.

The current tools for simulating climate change generally focus on global and regional-scale modeling. Global and regional-scale models lack the capability to represent explicitly many important small-scale processes. As a result, confidence in regional- and sub-regional-scale projections is lower than at the global scale. There is thus limited scientific capability in assessing, detecting, or measuring the relationship between emissions of GHGs such as CO₂ from a specific single source and any localized impact on a listed species, its habitat, or its members for purposes of ESA considerations. This is consistent with the U.S. Geological Survey's analysis, which observed:

It is currently beyond the scope of existing science to identify a specific source of CO₂ emissions and designate it as the cause of specific climate impacts at an exact location.³

EPA has developed considerable expertise in current global climate change research and has substantial experience in utilizing the available models to analyze GHG emissions. Notwithstanding the uncertainties associated with modeling single-source emissions and localized regional or sub-regional end-point impacts, EPA has conducted the following analysis

³ See note 2 *supra*.

and considered the anticipated GHG emissions from an individual source with the emissions estimates described above, in relation to the two listed coral species and the polar bears.

The proposed facilities for which Clean Air Act permits are pending vary in size and associated magnitude of GHG emissions. To assess the potential impact of the GHG emissions from EPA-permitted sources – and to help ensure that our analysis covers all such proposed sources that are foreseeable – EPA has conducted an assessment for a model facility using emissions estimates that are substantially greater than the emissions estimates from any actual project currently pending before EPA.⁴ In the analysis that follows, EPA used emissions estimates of 14,132,586 metric tons per year of CO₂, 273.6 metric tons per year of nitrous oxide (N₂O) and 136.8 metric tons per year of methane (CH₄), which are also GHGs.⁵ The following criteria pollutant emissions were used:⁶

- Ozone (O₃) (180.7 metric tons per year of volatile organic compounds)
- Carbon monoxide (CO) (6019 metric tons per year)
- Sulfur dioxide (SO₂) (3609 metric tons per year)
- Nitrogen oxides (NO_x) (3018.5 metric tons for first five years, then 2326.2 annual metric tons for the remaining 45 years)

Furthermore, based on the information we have on several pending facilities, EPA assumed that the model facility would have a useful life of approximately 50 years.

Using the well-established Model for the Assessment of Greenhouse-gas Induced Climate Change (MAGICC),⁷ changes in global CO₂ concentrations, global-mean surface air temperature and sea-level were projected resulting from the model facility's annual emissions of CO₂, N₂O and CH₄, as well as the relevant criteria pollutants (listed above), between 2013 and 2063,⁸ over

⁴ For the model facility, EPA used criteria pollutant and GHG emissions rates that are 20 percent greater than the emissions estimates from one of the largest of the proposed facilities – the Desert Rock Energy Facility. This source is a 1500 MW coal-fired steam electric generating unit to be located on lands of the Navajo Nation near Shiprock, New Mexico.

⁵ The Draft Environmental Impact Statement (EIS) for Desert Rock prepared by the U.S. Bureau of Indian Affairs estimates this facility will emit 12.7 million tons per year of CO₂. EPA calculated the methane and nitrous oxide rates by using AP-42 emissions factors and certain parameters reflected in the calculation of CO₂ emissions in the EIS for Desert Rock. We then converted these estimates to metric units and increased each number by 20 percent.

⁶ Criteria pollutant emissions are based on the Desert Rock permit application and final permit. The model facility emissions are 20 percent greater than these figures and converted to metric units.

⁷ Wigley, T.M.L. 2008. MAGICC/SCENGEN 5.3 (Model for the Assessment of Greenhouse-gas Induced Climate Change/SCENario GENerator): User's Manual. Boulder, Colo.: National Center for Atmospheric Research. <http://www.cgd.ucar.edu/cas/wigley/magicc/>

⁸ We presumed that a large facility receiving a PSD permit in 2008 would not begin operations, and hence emissions, until approximately 2013 due to construction and other activities. If the climate modeling exercises described in this letter were to start a few years before 2013, it is expected that the timing of results would vary only slightly but that the magnitude of results would be essentially the same. If the modeling analysis were to be conducted over a time frame longer than 50 years (i.e., assuming a power plant lifetime of 75 years for example), but with the same amount of annual emissions, the climate effects described in this letter would still be the same over the initial 50-year period, but would then be slightly greater after 50 years, showing greater and longer-lasting climate effects.

which time these annual emissions (with the exception of NO_x) are assumed to remain constant.⁹ The results are relative to one global GHG emissions scenario (A1B) used by the IPCC, but with a range of different climate sensitivities.¹⁰ Going out to 2100, the model estimates that the maximum global atmospheric CO₂ concentration increase resulting from the model facility's emissions occurs approximately 50 years after the facility begins emitting and is approximately 0.06 parts per million, corresponding to approximately 0.01 percent of total global atmospheric CO₂ concentrations projected over this time period. The maximum global mean temperature increase resulting from the emissions occurs approximately 50 years after the facility begins emitting and ranges approximately between 0.00022 to 0.00035 degrees Celsius (°C) (0.00037 to 0.00063°F), corresponding to approximately 0.01 percent of the total global mean temperature increase resulting from the projected global GHG emissions over this time period.

Regarding climate change over the Caribbean and Arctic (habitat for the listed coral and polar bear species, respectively), regional models can project temperature changes resulting from global-scale GHG emissions. A widely-accepted and used regional model is the SCENario GENERator (SCENGEN) model.¹¹ SCENGEN operates in conjunction with MAGICC and projects a warming of 1.4-2.5 °C (2.5-4.5°F) for global emissions (based on scenario A1B) for an area (5 degree by 5 degree grid box) centered over the U.S. Virgin Islands (20 degrees north by 65 degrees west) in 2070 (approximately 50 years after the facility begins emitting, coinciding with the maximum warming in the global mean temperatures analysis).¹² In addition, SCENGEN projects a warming of 3.6-6.3 °C (6.5-11.3°F) for global emissions (based on scenario A1B) for an area (5 degree by 5 degree grid box) centered over the southern Beaufort Sea in the Arctic (off the northern coast of Alaska, 75 degrees north by 145 degrees west) in approximately 50 years after the facility begins emitting, coinciding with the maximum warming in the global mean temperatures analysis.

SCENGEN, however, cannot process the changes due to a single source's emissions. Nonetheless, we note that applying the proportion of the global mean warming potentially due to the model facility as indicated above through use of MAGICC (approximately 0.01 percent) to the Caribbean results gives a maximum projected regional warming of 0.00014-0.00025°C

⁹ As described above, the CO₂ emissions rate for the model facility reflects a rate of CO₂ emissions substantially greater than the rate estimated for any of the proposed facilities currently under review within EPA. With regard to NO_x emissions, the permit for the Desert Rock facility (which formed the basis for the model facility emissions) decreases the NO_x emission limits (and thus associated emissions) over time.

¹⁰ Range accounts for model runs with climate sensitivities varying between 2 and 4.5°C. Climate sensitivity refers to the equilibrium change in global mean surface temperature following a doubling of the atmospheric CO₂ concentration. This value is estimated by the IPCC Fourth Assessment Report as likely to be in the range 2 to 4.5°C with a best estimate of about 3°C.

¹¹ Wigley, T.M.L. 2008. MAGICC/SCENGEN 5.3 (Model for the Assessment of Greenhouse-gas Induced Climate Change/SCENario GENERator): User's Manual. Boulder, Colo.: National Center for Atmospheric Research. <http://www.cgd.ucar.edu/cas/wigley/magicc/>

¹² SCENGEN was only run using the global emissions scenario (A1B). SCENGEN was not run using the emissions estimates described above alone. Instead, the global emissions results were scaled to the single source level according to the proportion of the global mean warming due to the single source computed in MAGICC.

(0.00025-0.00045°F) potentially due to the model facility's GHG emissions.¹³ Applying a similar scaling to the Arctic results (for global-scale emissions) gives a maximum projected regional warming of 0.00036-0.00063°C (0.00065-0.00113°F) potentially due to the GHG emissions analyzed here. Although confidence in regional temperature projections is generally lower than confidence in global average projections, these results are consistent with the well-established notion that warming over the tropical oceans will be less than the global average and that warming over the high latitudes will be significantly more than the global average.

As noted earlier, once CO₂ is emitted it becomes well mixed in the global atmosphere due to its long atmospheric lifetime. Some of the CO₂ emitted, however, is absorbed by land vegetation and the oceans. Since the 1980s, about half of the anthropogenic CO₂ emissions have been taken up by the terrestrial biosphere and the oceans. Uptake of CO₂ can increase the acidic levels of the oceans. The IPCC has noted that ocean acidification due to the direct effects of elevated CO₂ concentrations will impair a wide range of planktonic and other marine organisms that use aragonite to make their shells or skeletons. To project the change in tropical ocean pH that would occur as a result of a change in atmospheric CO₂ from the model facility analyzed above (0.06 ppm), EPA used the Program Developed for CO₂ System Calculations.¹⁴ The program computed a pH reduction of approximately 0.0001 units in 2070 (approximately 50 years after the facility begins emitting, coinciding with the maximum 0.06 ppm CO₂ concentration increase).

Our review of the relevant scientific literature provides no information that would indicate that corals would be sensitive to temperature or pH changes of this magnitude. Furthermore, such changes cannot be physically measured or detected. There are limited tools available for assessing the effects of projected climate changes on listed species. EPA is aware of the COMBO model,¹⁵ used to project the effects of climate changes on corals at regional scales. The COMBO model for coral assessment has only recently been accepted for publication, and its methods have not been widely vetted by the research community, nor its application widely tested by users. The COMBO model may be used to calculate the impacts to Caribbean coral reefs from changes in average sea-surface temperature and CO₂ concentrations due to projected global emissions, such as scenario A1B from IPCC. However, this model cannot process the single-source incremental changes in CO₂ concentrations and temperature discussed above. Moreover, any attempt to scale COMBO results based on the incremental CO₂ concentrations that would be due solely to a single source's emissions would represent a novel and untested application of model results. At this time, EPA does not believe that such a novel application would be consistent with the best available data standard for ESA purposes to assess potential impacts of single-source emissions on the corals at a regional scale. We note, however, that any such scaling would necessarily substantially reduce any projected potential impacts.

¹³ Over the tropical oceans, on average, the surface air temperature is about the same as the sea surface temperature.

¹⁴ Lewis, E., and D. W. R. Wallace. 1998. Program Developed for CO₂ System Calculations. ORNL/CDIAC-105. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tennessee.

¹⁵ Buddemeier, R., P. Jokiel, K. Zimmerman, D. Lane, J. Carey, G. Bohling, and J. Martinich, 2008. A modeling tool to evaluate regional coral reef responses to changes in climate and ocean chemistry. *Limnology and Oceanography Methods*: In Press.

Likewise, our review of the relevant scientific literature provides no indication that any specific degree of polar bear sensitivity can be attributed to global or regional temperature changes of the magnitudes described above. EPA is also aware of the extensive analysis performed by the U.S. Department of the Interior (DOI) to support listing the polar bear as a threatened species, using sea ice projections from general circulation models (GCMs), carrying capacity (considering population and habitat) models and a Bayesian¹⁶ network model. EPA is not aware of modeling tools that could be used to analyze the implications of single source emissions on polar bear populations. Any attempt to scale the results of DOI's analysis based on the incremental CO₂ concentrations that would be due solely to a single source's emissions would represent a novel and untested application of model results, and thus would not be consistent with the best available data standard for ESA purposes.

The best available climate change modeling tools predict that a source with GHG emissions in amounts equal to or less than those of the model facility analyzed above will have at most an extremely small impact on average global temperature and global atmospheric CO₂ concentrations over and beyond the anticipated functional lifetime of the proposed source. Regional modeling and any associated downscaling calculations to predict effects at a specific species location introduce untested approaches and additional uncertainties. It is clear that any such temperature and ocean acidification outputs, or any specific impact on the corals or polar bears, would be too small to physically measure or detect in the habitat of these species. Known tools for assessing the impacts of these small climate changes on the two listed coral species and polar bears are presently insufficient for quantifying potential effects. While the foregoing conclusions apply to the listed coral species and polar bears, the MAGICC modeling is not specific to any particular species or its members or any specific location, and the same outputs would constitute the first step in an assessment of impacts on other species. Given the very small global mean climate change magnitudes projected based on the emissions of this type of single source, we believe the outputs of such a single source impact analysis for other species in other locations would also be of an extremely small magnitude that is too small to physically measure or detect.

In these circumstances, and also in light of the uncertainties in attempting to use the models' outputs to predict impacts at a local level, EPA has determined that the risk of harm to any listed species, including the listed corals or polar bears, or to the habitat of such species based on the anticipated emissions of the model facility as described above, or any facility with lower emissions, is too uncertain and remote to trigger ESA section 7(a)(2) obligations. Section 7(a)(2)'s purpose of ensuring no likely jeopardy to listed species and no destruction or adverse modification of designated critical habitat is not implicated by such remote potential risks. See, e.g., *Ground Zero Center for Non-Violent Action v. U.S. Department of the Navy*, 383 F.3d 1082 (9th Cir. 2004) (where the likelihood of jeopardy to a species is extremely remote, consultation is not required). This reasoning is consistent with the conclusion reached by FWS and DOI that consultation under ESA section 7(a)(2) is not required for GHG emissions from a single source.

¹⁶ Bayesian Network models represent a set of interacting variables that are linked by probabilities. They provide an efficient way to represent and summarize understanding of a system, and can combine empirical data and expert knowledge into the same modeling structure. They are also particularly useful in synthesizing large amounts of quantitative and qualitative information to answer "what if" kinds of questions.

While FWS has already determined that ESA consultation in general would not be required on proposed permits or licenses for individual facilities that emit GHGs, we nonetheless would appreciate a response from each of you regarding our determination at your earliest convenience.

Sincerely,

A handwritten signature in black ink, appearing to read "Robert J. Meyers", written in a cursive style.

Robert J. Meyers
Principal Deputy Assistant Administrator
Office of Air and Radiation