The algae take in sunlight, grow in saltwater in sealed, clear plastic photobioreactors, carbon dioxide is introduced, each cell produces and excretes ethanol into the culture, and that ethanol evaporates into the headspace for collection and purification. Algenol can do this on marginal land, and without collecting, harvesting and killing the algae. The cultures live for over a year and channel carbon directly into ethanol production.

Significant economic and energy advantages are gained with collecting an evaporative product, and producing a single molecule that is always the same ethanol molecule. It requires separation from water, but no further refining into a homogenous, fuel ready product. Significant infrastructure already exists in the U.S. to blend ethanol. Ethanol has been maligned in the press lately when connected to corn, but ethanol is not the problem. When made cheaply enough and not from food, consumers have shown that they readily accept it in automobiles.

Algenol started with $70 million in equity funds from its 4 founders. The founders include:

- *a public company biotech pharmaceutical executive who founded and built a successful drug company with 350 employees and $50 million in sales;*
- *a second public company biotech executive that formed and launched a commercial contract manufacturing company that provides biopharmaceutical companies manufacturing services to scale-up from bench-top scale to commercial scale production compliant with US FDA Good Manufacturing Practices regulations;*
- *an energy company founder who built from his garage a $100 million public company, and a $70 million private energy company with over 800 employees in 6 states operating 4 natural gas pipelines and storage facilities, and complex natural gas hedging and risk management; and*
- *one of the four executives who control and operate the Corona beer company, including Grupo Modelo's packaging and paper products division.*

Algenol's strength is not just centered on its financial strength, but on it people, including:

- *the people who invented the technology in 1984 and developed the technology to proof of principle in 1998;*
- *the other inventors that have sought patents in algae to ethanol;*
- *the people heading the leading blue-green algae natural products company with 15 years experience;*
- *the people heading one of the largest commercial algae growers in Europe with 10 years experience;*
- *a former ExxonMobil executive and expert in CO2 capture systems, whose work included the direction of over 150 scientists and engineers in a major division of ExxonMobil Chemical;*
- *VeraSun Energy's former General Counsel and EH&S manager;*
- *Amgen's former Senior Project Manager, charged with scale up to commercial launch;*
- *Unilever's former VP General Manager;*
- *2 national academy members;*
- *a very strong Scientific Advisory Board; and*
- *many leading scientists and engineers all contributing to the foundation of Algenol, which has now become 100 of the most dedicated leaders in algae biofuels in the world.*

Algenol has brought together world-class partners with significant capabilities of their own and these capabilities bring many competitive advantages to Algenol and the overall Direct to Ethanol™ technology. The Dow Chemical Company, Georgia Tech, the National Renewable Energy Laboratory and Membrane Technology & Research (MTR) are all a part of Algenol's application.

The Dow Chemical Company will provide support from three of its businesses, namely the Polyethylene,

Hydrocarbon, and Energy businesses. Dow brings significant expertise in advanced polymer science directly impacting the cost, functionality, and durability of our photobioreactors. Dow will be providing
Exemption 4

Steven Gluck, Ph.D., one of Dow's top experts in analytical chemistry, water treatment and algae technology, will lead the Dow effort.

Georgia Tech and MTR will provide expertise in several key areas to the advanced commercialization of the Direct to Ethanol™ technology. Georgia Tech will conduct research aimed at a broad spectrum of technology improvements, all of which bear directly or indirectly on the reduction of ethanol production costs. The work divides into four areas:
Exemption 4

Bill Koros, Ph.D., and Chris Jones, Ph.D., lead this initiative at Georgia Tech. Richard Baker, Ph.D., will lead the initiative for MTR.

While we have an ethanol water separation process that works and is economical today, we believe that we can significantly improve the efficiency and reduce energy expenditure through further advanced research in this area. Water separation from ethanol presently represents 80% of our non-solar energy input. Clearly, it is a major opportunity for reduction in production costs, and this is a big advantage for Algenol both in terms of cost and energy savings, but also in terms of carbon footprint savings. The proposed research into advanced ethanol-water separation systems will have three main components.
Exemption 4

**More than $30 million dollars has been spent on R&D to date by Algenol. Algenol's application to the DOE is not centered on future research. Although this application does contemplate targeted R&D up to the maximum 10%, nearly three million dollars of the total budget, all of the R&D done through the end of 2009 will be done with Algenol's capital.*

Clearly, this application is centered on advancing the compelling R&D and scale up that has been completed to date by Algenol. The funds from the DOE will bring this advanced algae ethanol biofuel technology out of the large scale, and propel it into commercial-scale in an integrated way.

Algenol photobioreactors and process design parameters achieve cost reduction in the three primary areas: material and structure, energy required for mixing, and product harvest expense. Through thermodynamic processes and assisted by culture mixing, ethanol evaporates into the photobioreactor's headspace and subsequently it condenses on the upper inside surface of the same photobioreactor's headspace and is enriched over the ethanol concentration in the culture. To take advantage of this Algenol has developed from scratch three generations of photobioreactors. Each was built and tested and scaled to culminate in a very low cost commercial-scale flexible film photobioreactor system at 4,500 liter each. Algenol's plastics experts, with over 150 years experience, and Dow's advanced material group, will do final designs and specs for the Freeport, Texas pilot-scale integrated biorefinery.

Algenol has built the largest collection of blue-green algae in the world, built from scratch two separate research and development labs with over 60 scientists working on many projects including a rapid screening lab and proprietary screening paradigm, built a separate engineering lab with significant engineering capability, built rapid outdoor algae screening capabilities at two separate facilities, and built a licensed aquaculture facility and Process Development Unit in Florida, all within 3 years. Algenol will employ thousands of people in the future, and many at very high wages.

Algenol has detailed conceptual blueprints completed for the pilot-scale integrated biorefinery on Dow's land in Freeport Texas. Algenol has completed detailed engineering work as well. In our application we allow Exemption 4

Algenol has already demonstrated its ability to attract the very best talent, execute on its plan, and scale up working systems, all of these lead to a successful pilot-scale integrated biorefinery and ensures that the DOE's accomplishes its goal as well.

2. Does any part of your project require review and/or permitting by any other federal, state, regional, local, environmental, or regulatory agency? If yes, please describe.

Algenol Biofuels Response: *Yes.*

Federal regulation:

Hybrid Algae: *Under the 1986 Coordinated Framework for Regulation of Biotechnology, either the U.S. Department of Agriculture (USDA) or the U.S. Environmental Protection Agency (EPA) would be responsible for regulating the use and management of our hybrid algae. Presently, we anticipate that the EPA will exercise its authority under the Toxic Substances Control Act (TSCA) to regulate our hybrid algae under 40 CFR Part 725 as microbial products of biotechnology.*

Based upon direct discussions with EPA staff and advice of counsel, we do not anticipate EPA imposing regulatory restrictions that would impair our ability to proceed with this project as planned. In part, this is because every stage of Algenol's development, use, transportation and disposal of hybrid algae will take place in contained facilities or vessels, consistent with EPA's TSCA regulations.

Initial laboratory scale research and development takes place at Algenol's research laboratory in Baltimore, MD. The largest individual cultures used in the Baltimore lab are in the order of 80L. All Baltimore research takes place inside the laboratory in hard reactors within environmental chambers.

At present, Algenol has over 300 strains of ethanol producing algae. It must be said that Algenol does not believe that any component, together or separately, are in any way dangerous. The genes and enzymes over expressed and produced in the hybrid algae are very widely found in nature and in many of the foods you eat every day. Almost every handful of surface soil in most areas of the temperate planet would contain cyanobacteria of some sort, and many have these genes and or the ability to make ethanol naturally. Foods that would have been made with these genes and enzymes are all regular bread, all beer and all wine. Also these same genes and enzymes are found on the store-shelf of every grocery store in America in packets of yeast used for making bread. Algenol has not used synthetic biology to make synthetic genes or proteins that have never existed before. Blue-green algae are in most areas of the planet, and the genes and natural enzymes that Algenol uses Exemption 4 *Algenol works with very commonly found enzymes that are very safe, yet we understand that until time has passed, and everyone has had time to see how safe these hybrid algae are, we take extraordinary steps and actions used during the handling of much more dangerous material in a belt and suspenders approach to safety. We want everyone to see in the end that these algae are incredible simple, like yeast, but also incredibly safe.*

Exemption 4

Exemption 4

**In light of the above, when handling hybrid algae, scientists wear disposable gloves and goggles as necessary inside any laboratory. The organisms are killed with bleach following experiments and any materials that come into contact with such organisms are either autoclaved or cleaned with bleach or 70% ethanol solution and are then properly disposed of. The biomass is removed from the laboratory on a regularly scheduled basis by an authorized contractor specializing in waste transportation.*

When a strain of hybrid algae is approved for larger scale production, a very small, laboratory-scale, volume of the strain (cells maintained on agar slants as stocks) will be transferred from the Baltimore laboratory to the laboratory at the Texas pilot project facility. This transfer will be under contained conditions in order to minimize risk of environmental release. Moreover, such transfers are anticipated to occur rarely. Ideally, such a transfer would occur once and all future hybrid algae would be grown from the transferred stock at the Texas facility.

Once in the Texas laboratory, the algae will be placed in a liquid culture and scaled up from the level of Petri dish, to flask, to larger containers within a greenhouse. Exemption 4 *. This phased scale up approach is a necessary component of successful production of these algae. It is unlikely that they will survive a direct transfer from a small container in which their mass makes up the volume of the container to a far larger container in open sunlight. This natural limitation provides an inherent protection against unintended survival in the environment. An even greater assurance against such unintended survival is the fact that the hybrid algae are unable to compete and survive or reproduce outside the saltwater culture medium in the photobioreactor. This photobioreactor maintains optimum conditions for their survival not found in nature.*

**From the greenhouse, the algae will be transferred to enclosed, sealed photobioreactors, as described more fully in the Project Execution Plan and elsewhere.* Exemption 4

**We also take multiple, redundant steps to prevent any escape from containment of the algae during any stage of processing.* Exemption 4

Exemption 4

. In sum, Algenol has taken reasonable measures to ensure that the hybrid algae will be used only inside the constraints of physical confinement similar to those that are found in a laboratory, greenhouse, or other contained structure.

Algenol has met with the EPA Chemicals Branch personnel to explain in detail our proposed project to demonstrate our DIRECT TO ETHANOL™ process for biofuel production. Following our meeting with the EPA, we are now preparing to submit the appropriate information to the EPA in order to facilitate that agency's review and approval of any necessary clearances under TSCA. We anticipate that EPA review of our submittal will be concluded before applicants under this funding opportunity are selected for grants. Regardless of the results, Algenol will share EPA's final review document with all appropriate DOE officials as soon as it is available. Algenol is prepared to, and will, comply with all regulatory requirements set out by EPA under TSCA, including any additional containment, handling or disposal requirements.

**Under the distribution of regulatory authority laid out in the Coordinated Framework, we do not believe that we would be subject to regulation by USDA. At USDA, the Animal and Plant Health Inspection Service (APHIS), regulates certain microorganisms under the Plant Protection Act. These regulations are found at 7 CFR Part 340. APHIS regulates organisms altered or produced by genetic engineering if APHIS has reason to believe the organism is a "plant pest." Pursuant to those regulations, Algenol has submitted a letter to APHIS providing a detailed identification of the hybrid algae that we use to produce ethanol fuel, as well as our analysis of the relevant regulations. The letter concludes by stating that the hybrid algae used by Algenol are not identified plant pests as defined by APHIS and do not have characteristics similar to plant pests. We understand from conversations with APHIS officials that APHIS and EPA are currently in discussions to determine their respective jurisdiction over Algenol's hybrid algae. Of course, if EPA and APHIS determine that APHIS is the appropriate federal regulator of our hybrid algae, Algenol will comply with all appropriate APHIS regulatory requirements, including those regarding the permitting of interstate movement. Due to the contained nature and operation of the photobioreactors, we do not anticipate the need for an APHIS environmental release permit.*

***Air:** As a minor source, the projected facility will not require federal new source review. We do not anticipate EPA or the Texas Commission on Environmental Quality imposing regulatory burdens that outweigh the value of developing the project since Algenol's process does not place human health or the environment at risk. On the contrary, biofuel production by Algenol at the pilot-scale project proposed in this funding application, and at any follow-on commercial scale facilities, will actually benefit human health and the environment by displacing less preferred fuels. Algenol's biofuel will contribute less net greenhouse gas emissions than any conventional transportation fuel and less than many other advanced technology biofuels. Carbon dioxide, the only greenhouse gas emitted from combustion of fuel produced using DIRECT TO ETHANOL™ technology, is entirely derived from captured industrial sources or, potentially, from the ambient air. None of it is added to the atmosphere from fossil fuel combustion. Minimal amounts of ethanol vapor and carbon dioxide will be released, and all water will be purified before release under the terms of an existing state water permit.*

***Water:** There is an existing water permit for the Dow site, the federal rules will be addressed through the permit. The current site under consideration is described as "undeveloped" and Dow would need to describe this unit description under the appropriate permit discharge outfall.*

Before any earthwork can be done, the land involved needs to be determined to not contain jurisdictional wetlands. The particular area involved does not likely contain jurisdictional wetland but it will need to be confirmed. Dow Chemical has several alternative locations at its Freeport facility in the event of

restrictions on this specific 24 acres. The overall Freeport facility is many thousands of acres "inside the block" and there are 4 or more 30-acre areas that can serve as backup sites if this first chosen area is found to be unsuitable or too expensive compared to other specific sites also within the same Freeport block.

Spill Prevention Control and Countermeasures, SPCC, regulations are expected to not be applicable due to the small quantities of oils being stored on the site.

Because Algenol uses saltwater, not fresh water, as a feedstock, the project will conserve freshwater that would otherwise be consumed to make the fuel we displace. Algenol fuel will also conserve land. Algenol anticipates making 6,000 gallons of fuel per year per acre without using fossil fuel-based fertilizers. Corn-based ethanol is produced at a rate of approximately 400 gallons per year per acre. Algenol will use land that is not suitable for any other crop production. Algenol requires no energy intensive fuel refineries.

Alcohol and Tobacco Tax and Trade Bureau: *A bureau of the Department of Treasury, the Alcohol and Tobacco Tax and Trade Bureau is responsible for collecting excise taxes and administering certain permitting requirements associated with the production of alcohol. Algenol's envisioned facilities will be classified as Alcohol Fuel Plants because they will be producing alcohol exclusively for use as a fuel. As such, Algenol will apply for and receive the required Alcohol Fuel Producers Permit in accordance with all rules and regulations.*

EPA Renewable Identification Numbers: *The EPA's RIN program is an administrative element of the Renewable Fuel Standard used by obligated parties and renewable fuel producers to demonstrate compliance with usage mandates and track the volumes of renewable fuels. As Algenol begins commercial production and transfer of ethanol, we will be fully compliant with the labeling and reporting requirements of the RIN program.*

State, Regional, Local regulation:

Hybrid Algae: *The location of the pilot plant has no state, regional or local regulations specific to the regulation of our hybrid algae or other biotechnology-derived organisms.*

Air: *The projected facility will be a minor source of air emissions and require state authorization under TAC 30 Ch. 116 and/or Ch. 106. Based on preliminary data an actual permit under Ch. 116 will not be needed. The project can be authorized under permit-by-rule §106.261. This will require registration with the Texas Commission on Environmental Quality for their review.*

Water: *A construction stormwater permit will be needed for the earthwork in preparing the site and for the construction of the actual project. The location being considered would be covered by Dow's existing site water permit.*

When completed and normal operations begin, stormwater from the project site and any process wastewater will need to be addressed within the site's water permit. Depending on the nature of the water, this could be fairly easy and quick or could take several months to authorize.

The site will have appropriate concrete containment.

3. Has any review (e.g., NEPA documentation, permits, agency consultations) been completed? If yes, is a finding or report available and how can a copy be obtained?

Algenol Biofuels Response: *No.*

Federal: *As mentioned above, Algenol has submitted a letter to APHIS providing a detailed identification of the hybrid algae that we use to produce ethanol fuel, as well as our analysis of the relevant regulations, and seeking an opinion letter from APHIS that that its hybrid algae are not "regulated articles" under 7 C.F.R. Part 340 and their use does not require a permit or other authorization APHIS.*

If APHIS were to exercise jurisdiction over Algenol's hybrid algae, its regulation would likely only extend to permitting the occasional interstate transfer of hybrid algae cell cultures between the Baltimore research facility and the Texas pilot plant. The issuance of such interstate movement permits is categorically excluded under APHIS's NEPA implementation regulations. 7 CFR § 372.5(c)(3)(iii)(B). This interstate movement would not trigger any of the exceptions to APHIS's categorical exclusions, as set forth at 7 CFR § 372.5(d).

EPA's regulation of our hybrid algae under TSCA would occur under regulations at 40 CFR Part 725. These regulatory activities would likely be found to constitute "functional compliance" with NEPA requirements. See Environmental Defense Fund v. EPA, *489 F.2d 1247, 1257 (D.C. Cir. 1973). However, it is well-established that this would not exempt DOE from undergoing its own NEPA review for its funding of this project.* See Oregon Environmental Council v. Kunzman, *714 F.2d 901, 905 (9th Cir. 1983).*

Under DOE's own NEPA implementation regulations, Algenol's activities should also be categorically excluded from additional NEPA environmental review. Based on the absence of any significant risk to health, safety or the environment, this pilot project should be treated in a manner similar to those described in Appendix B to 10 CFR Subpart D of Part 1021, including categorical exclusions applicable to site characterization, monitoring and general research, such as B3.6 "Siting/construction/operation/decommissioning of facilities for bench-scale research, conventional laboratory operations, small-scale research and development and pilot projects"; "Siting, construction (or modification), operation, and decommissioning of facilities for indoor bench-scale research projects and conventional laboratory operations (for example, preparation of chemical standards and sample analysis; small-scale research and development projects; and small-scale pilot projects (generally less than two years) conducted to verify a concept before demonstration actions. Construction (or modification) will be within or contiguous to an already developed area (where active utilities and currently used roads are readily accessible.); or B3.12 "Siting, construction (or modification), operation, and decommissioning of microbiological and biomedical diagnostic, treatment and research facilities...".

State of Florida:

Aquaculture License; Hybrid Algae*: Algenol has a scale up facility situated on approximately five acres in Loxahatchee, Palm Beach County, Florida at which scale up is done from the laboratory scale, to the greenhouse and photobioreactor scales. Algenol has approximately 15 scientists, engineers and support staff at this scale up facility. When fully operational, the Palm Beach County facility would include* Exemption 4

The Palm Beach County facility is licensed by the State of Florida as an aquaculture facility for nearly two years, is operated as a zero discharge facility, and at all times has operated in compliance with Florida's Aquaculture Best Management Practices. We have had several inspections and have passed all without any compliance issue, delay or stop orders. All work with the hybrid algae at the Palm Beach County scale up facility will be conducted in fully enclosed photobioreactors that are situated in a lined containment area. The description of the workings of the pilot project in Sec. I, 2 also apply to the Palm Beach County scale up

facility. The State of Florida has no state laws or regulations specific to Algenol's hybrid algae.

Algenol has, however, initiated discussions with the Florida Department of Agriculture, Division of Aquaculture, to determine what additional permits or licenses, if any, are required to conduct scale up at the facility with our hybrid algae.

Air: *Algenol has applied for and obtained a Generic Facility Exemption from Palm Beach County relating to air permit rules for its aquaculture scale up and development facility located in Loxahatchee, Florida. This exemption request is made pursuant to Florida Administrative Code Chapter 62-210.300 Section (3)(b)2.*

Presently, the Palm Beach County facility does not generate ethanol or any other biofuel from algae, however, Algenol is testing the ability of various algae strains to withstand exposure to ethanol in concentrations that would be observed in commercial production. Exemption 4 *. During the course of these experiments, some ethanol will be vented to the atmosphere periodically until the cultures are free of ethanol. Following Algenol's calculations, it was concluded that any annual VOC emissions would be far less than the amount allowed by the Generic Facility Exemption at F.A.C. Chapter 62-210.300 Section (3)(b)2 and far below any Federal or State regulations.*

4. Is the proposed project part of a larger scope of work? If yes, please describe.

Algenol Biofuels Response: *Yes, as described in the "Business and Commercialization Plan" section of this application. Algenol has an aquaculture and scale up facility situated on approximately five acres in Palm Beach County, Florida. Algenol has approximately 15 scientists, engineers and support staff at this scale up facility. At a research laboratory in Baltimore, Maryland, Algenol employs nearly 20 scientists, engineers and support staff. The Baltimore laboratory is focused on the identification, molecular modification, and testing of algae species suitable for biofuel production.*

Algenol understands from instructions provided in Appendix E to the FOA that NEPA information should be provided only for the primary location(s) at which work would be done, and that NEPA information for locations such as the following does not need to be included: routine laboratory, document research, and routine crop growing or feedstock collection. See FOA, Appendix E at 95. For that reason, the remainder of Algenol's responses will focus on the Texas facility where this project will take place. Algenol understands that, should this proposal be accepted, additional NEPA information must be submitted regarding its activities in Maryland and Florida.

5. Do you anticipate requesting additional federal funding for subsequent phases of this project? If yes, please describe.
   Algenol Biofuels Response: *No.*

6. Does the scope of your project **only** involve one or more of the following:
   - Information gathering such as literature surveys, inventories, audits,
   - Data analysis including computer modeling,
   - Document preparation such as design, feasibility studies, analytical energy supply and demand studies, or
   - Information dissemination, including document mailings, publication, distribution, training, conferences, and informational programs.

   Algenol Biofuels Response: *No, the project will include the production of fuel grade ethanol.*

PART II: Environmental Considerations

1. Clearing or Excavation (indicate if greater than 1 acre)
   Algenol Biofuels Response: *Yes.*
   - *The specific nature or type of activity or condition:*
     - *24 acres will be filled*

   - *Whether a consultation, approval, or permit applies and a description and status of the permitting/approval/documentation process:*
     - *Before any earthwork can be done, the land involved needs to be determined to not contain jurisdictional wetlands. The particular area involved does not likely contain jurisdictional wetland but it will need to be confirmed. Dow Chemical has several alternative locations at its Freeport facility in the event of restrictions on this land.*
     - *A construction stormwater permit will be needed for the earthwork in preparing the site and for the construction of the actual project. The location being considered would be covered by Dow's existing site water permit.*

2. Dredge and/or Fill. Specify the number of acres.
   Algenol Biofuels Response: *Yes, see answer above for item 1 clearing and excavation.*

3. New or Modified Federal/State Permits and/or Requests for Exemptions
   Algenol Biofuels Response: *Yes.*

   - *The specific nature or type of activity or condition:*
     - As discussed more fully in Sec. I, 2, above, Algenol expects that its work with hybrid algae will be regulated by EPA under TSCA. Algenol has written to APHIS to confirm that that agency will not regulate the hybrid algae as a potential plant pest under the Plant Protection Act. APHIS's response is pending.
     - The projected facility will be a minor source of air emissions and require state authorization under TAC 30 Ch. 116 and/or Ch. 106. Based on preliminary data an actual permit under Ch. 116 will not be needed. The project can be authorized under permit-by-rule §106.261. This will require registration with TCEQ for their review.
     - As a minor source, the projected facility will not require federal new source review.
   - *Whether a consultation, approval, or permit applies and a description and status of the permitting/approval/documentation process:*
     - Currently, we are in the process of completing emission calculations that will allow final confirmation of permit-by-rule applicability.

4. Pre-Existing Contamination
   Algenol Biofuels Response: *No.*

5. Asbestos
   Algenol Biofuels Response: *No. Asbestos has never been used on this land.*

6. Criteria Pollutants
   Algenol Biofuels Response: *No. Criteria air pollutants are addressed in the air permitting section.*

7. Non-Attainment Areas
   Algenol Biofuels Response: Yes, this is a non-attainment area for ozone. Air permitting is addressed in the previous section.

8. Class I Air Quality Control Region
   Algenol Biofuels Response: No, this is not a Class I Air Quality Control Region. Emissions from the facility will not impact any of these regions. The closest region is 700 miles away, Big Bend National Park.

9. Navigable Air Space
   Algenol Biofuels Response: *No.*

10. Areas with Special Designation (e.g., National Forests, Parks, Trails)
    Algenol Biofuels Response: *No.*

11. Prime, Unique or Important Farmland
    Algenol Biofuels Response: *No.*

12. Archeological/Cultural Resources
    Algenol Biofuels Response: *No. If a permit from the Corps of Engineers is required (i.e. Dredge and Fill of Wetlands), the process includes an archeological review and a study may be required. See Part I, section 2 above.*

13. Threatened/Endangered Species and/or Critical Habitat
    Algenol Biofuels Response: *No. If a permit from the Corps of Engineers is required (i.e. Dredge and Fill of Wetlands), the process includes a review of threatened and endangered species. We are not aware of any endangered species in this area.*

14. Other Protected Species (Wild Burros, Migratory Birds)
    Algenol Biofuels Response: *No. We are not aware of any protected species in this area. This would be reviewed in the course of the project and appropriate siting.*

15. Floodplains
    Algenol Biofuels Response: *No. The area is out of the floodplain. It is protected by the levee.*

16. Special Sources of Groundwater (e.g., Sole Source Aquifer)
    Algenol Biofuels Response: *No. We will not be using groundwater. There are multiple aquifers in the area.*

17. Underground Extraction/Injection (non-hazardous substances)
    Algenol Biofuels Response: *No. We will not be using underground extraction and injection.*

18. Wetlands
    Algenol Biofuels Response: *No. This area is currently considered non-jurisdictional. We will confirm this, see Part I, section 2 above.*

19. Coastal Zones
    Algenol Biofuels Response: *No. This land is separated by a levee.*

20. Public Issues or Concerns
    Algenol Biofuels Response: *No. Algenol's use of hybrid algae is most accurately characterized as the contained, industrial application of biotechnology, and we anticipate that it will be both regulated and accepted as such. To the extent any concerns are expressed, we are prepared to demonstrate the*

sufficiency of our containment measures and other actions taken to ensure that this project will not pose a risk to health, safety or the environment.

21. Noise
Algenol Biofuels Response: *No.*

22. Depletion of a Non-Renewable Resource
Algenol Biofuels Response: *No.*

23. Aesthetics
Algenol Biofuels Response: *No.*

24. Odor
Algenol Biofuels Response: *No.*

Section B. Would your project use, disturb, or produce any chemicals or biological substances? (i.e., pesticides, industrial process, fuels, lubricants, bacteria) For each materials or processes listed below please indicate:

1. Polychlorinated Biphenyls (PCBs)
Algenol Biofuels Response: *No.*

2. Import, Manufacture, or Processing of Toxic Substances
Algenol Biofuels Response: *No. Although the hybrid algae will likely be regulated under TSCA, the algal strains chosen for use are non-toxic.*

3. Chemical Storage, Use, and Disposal
Algenol Biofuels Response: *No.*

4. Pesticide Use
Algenol Biofuels Response: *No, with exception of a minimal amount of normal, licensed weed and pest control using EPA-registered products.*

5. Hazardous, Toxic, or Criteria Pollutant Air Emissions
Algenol Biofuels Response: *No.*

6. Liquid Effluent
****Algenol Biofuels Response:*** *The drainage from the containment area on which the photobioreactors are located is controlled by valves and the drain lines lead to buried sumps. Under normal operations, rainwater is drained from the containment area to the sumps by gravity. The sumps have pumps that will move the rainwater to the drainage ditch on the property. In the case of a spill, the drainage will be diverted to a water sterilization system that will remove biomass and sterilize the water using chlorine bleach. All sterilized water will be stored for reuse in the photobioreactors or evaporated in evaporation tanks.*

**The facility's water sterilization system uses*

Exemption 4

7. Underground Extraction/Injection (hazardous substances)
Algenol Biofuels Response: *No.*

8. Hazardous Waste
Algenol Biofuels Response: *No.*

9. Underground Storage Tanks
Algenol Biofuels Response: *No.*

10. Biological Materials. Indicate if genetically altered materials are involved.
Algenol Biofuels Response: *Yes.*

**The platform organisms to be used for this project include* Exemption 4

Please refer to Part. I, 2 Hybrid Algae for a more detailed discussion of the federal and state regulatory issues around, and the quantities of, hybrid algae involved.

Section C. Would your project require or produce any radiological materials? For each item below, please indicate:

1. Radioactive Mixed Waste
Algenol Biofuels Response: *No.*

2. Radioactive Waste
Algenol Biofuels Response: *No.*

3. Radiation Exposures
Algenol Biofuels Response: *No.*

NEPA R&D Laboratory Questions

1. Please provide and describe the location of the facility or facilities where lab work will take place.

Algenol Biofuels Response: *Laboratory facilities for non-routine analyses are located in existing laboratories of the Freeport, Texas site operations of The Dow Chemical Company. An additional new laboratory will be located in one of the project buildings for routine analyses.*

2. What type of safety protocols are in place in the areas where work will take place? Who monitors

these? Internally and externally? OSHA standards?

Algenol Biofuels Response: *Mr. Gregory Schlicht, Algenol's General Counsel will lead the Company's efforts to manage legal and regulatory issues. Prior to joining Algenol, Mr. Schlicht served as Senior Vice President, General Counsel and Corporate Secretary of VeraSun Energy, a leading producer and marketer of ethanol and distillers grains. While at VeraSun, Mr. Schlicht managed the Environmental, Health and Safety division for the company's 16 biorefineries. Mr. Schlicht's experience as the general counsel of two large public companies provides him with broad legal and commercial experience. As well, his work in the energy industry, including his role in managing commodity risks and Environmental, Health and Safety (EH&S) for 16 biorefineries, aligns well with his responsibilities at Algenol, which will help Algenol successfully construct and operate the pilot-scale biorefinery. Other members of the team responsible for regulatory and EH&S will include regulatory professionals, environmental, health and safety professionals, quality assurance/quality control, and legal professionals. The team will be responsible for preparing and submitting all required permits, developing and auditing compliance with EH&S procedures, and developing and monitoring compliance with Standard Operating procedures for the pilot-scale biorefinery.*

An EH&S director will plan, direct and implement EH&S programs, procedures and policies to ensure occupational, health and environmental safety compliance. The director will address, among other issues, OHSA's Laboratory Safety Standard, requirements for preparation of Chemical Hygiene Plans, Hazard Communication Standard, Occupational Exposure to Hazardous Chemicals in Laboratories Standard, and limits on airborne contaminants such as carbon dioxide and ethanol. Also, the director will conform standard operating procedures to OSHA's Process Safety Management standard in order to prevent or minimize the consequences stemming from a release of photobioreactor contents. Prior to developing a written action plan in consultation with employees, the director will complete a compilation of process safety information to ensure a full understanding of the technology, materials and equipment necessary to complete the project. The resulting process hazard analysis shall be proportionate to complexity of the project and will identify, evaluate and control the potential hazards of the processes.

The safety protocols will be the same protocols used by the Freeport site operations of The Dow Chemical Company. The facility will comply with all of The Dow Chemical Company's safety rules, standards and procedures, which comply with, and in many situations, exceed OSHA's requirements.

3. How are the gases, chemicals, heavy metals, etc.? handled, stored and disposed?

Algenol Biofuels Response: *There will be no heavy metals used or generated. Gases and chemicals are handled, stored and disposed of in accordance with Dow Chemical's EH&S standards that are applied consistently throughout the Freeport facility. The EH&S protocols will be the same protocols used by the Freeport site operations of The Dow Chemical Company. The facility will comply with all of The Dow Chemical Company's rules, standards and procedures, which comply with, and in many situations, exceed environmental regulations.*

4. What type of safety equipment is in place for the facilities (i.e. fume hoods, alarms, scrubbers, etc...)?

Algenol Biofuels Response: *During design and construction the safety equipment will be planned and considered using similar models to existing facilities on the Freeport site. There will be pre-startup EH&S reviews conducted jointly by Algenol and Dow to ensure all safety requirements are met before use of the facilities. For example, Dow will determine if there will need to be a fume hood for any lab analyses. Dow will probably require a fire monitor and there will be fire extinguishers and safety shower/eye wash stations. The facility will be inside the Dow fence-line and, therefore, Dow security personnel will manage access. Also, the building will be tied into the site-wide alert system for*

notifications and Dow on-site 24-hour emergency response personnel/equipment will respond as needed for fire, medical and other emergencies.

5. What permits are in place for the facility for this type of work? Please list.
Algenol Biofuels Response: *Presently, Dow has a water permit for the site. The facility will be located within the fence-line of The Dow Chemical Company's Freeport, Texas Operations complex. The complex has a site water and hazardous waste permit.*

6. What permits are needed or will be acquired for this type of work? Please list.
Algenol Biofuels Response: *See response to question I.2 above.*

7. How is liquid effluent handled and discharged?

Algenol Biofuels Response: *Laboratory liquid effluent and process liquid effluent will be collected in a tank and transported to Dow's on-site wastewater treatment plant.*

8. How is toxic waste handled, stored, disposed?
Algenol Biofuels Response: *The project will not generate any toxic waste.*

9. Will the work being done create any air pollutants? If so please explain how these are handled/disposed/mitigated.
Algenol Biofuels Response: *Yes. The air emissions from this facility are primarily fugitive emissions of ethyl alcohol. They will be controlled by implementing a leak detection and repair program. Good engineering practice will be used to minimize other sources of potential emissions.*

10. Are Genetically Modified Organisms (GMOs) being used? If so please describe how these will be transported, stored, handled and disposed. How are these classified by APHIS? By TSCA? By state and local agencies?
Algenol Biofuels Response: *Please see response above to Part I, 2. Hybrid Algae*

11. Will prototypes be tested in a separate location, if so, please describe the location and answer questions #1-9?
Algenol Biofuels Response: *Yes.*

- *Algenol has an aquaculture and scale up facility situated on approximately five acres in Loxahatchee, Palm Beach County, Florida. Algenol has approximately 15 scientists, engineers and support staff at this scale up facility. See Sec. I.2 for a further discussion of the Florida facility.*
- *Algenol has a research laboratory in Baltimore, Maryland, that employs nearly 20 scientists, engineers and support staff. The Baltimore laboratory is focused on the identification, molecular modification, and testing of cyanobacteria species suitable for biofuel production. Only basic research is performed at this facility. All research is conducted indoors, in a contained facility, and at laboratory quantities. Hybrid algae at this facility are subject to regulation under TSCA and EPA implementing regulations.*

12. Are subcontractors being used for some of the work? If so please answer Questions #1-10 for work being completed by subcontractors.
Algenol Biofuels Response:

- *No. All laboratory work is expected to be completed on-site by project team members.*

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
NATIONAL RISK MANAGEMENT RESEARCH LABORATORY
CINCINNATI, OHIO 45268

April 23, 2009

Craig R. Smith, M.D.
Executive Vice President, Chief Operating Officer
Algenol Biofuels, Inc.

Dr. Wood,

The purpose of this letter is to indicate our interest in supporting the project "**Demonstration of Pilot-Scale Integrated Biorefinery Operations for Producing Ethanol From Algae**" submitted as a proposal to the U.S. Department of Energy under Funding Opportunity DE-PS36-09GO99038 - Demonstration of Integrated Biorefinery Operations. As you know, the U.S. Environmental Protection Agency's National Risk Management Research Laboratory (USEPA-NRMRL) has an active in-house research program in the conversion of biomass to alcohol-based biofuels with an emphasis on the efficient recovery of the alcohols from dilute bioreactor media and the dehydration of the alcohols to meet product specifications. We believe our background in efficient alcohol-water separation systems will help the Algenol-led team successfully develop their algae-based ethanol production platform.

Our separations research group has a long history of supporting biofuels projects, including collaborating with industrial partners on projects funded by the U.S. Department of Agriculture, U.S. Army, and the U.S. Department of Energy. We are currently collaborating through a cooperative research and development agreement (CRADA) with a membrane separation company and member of your project team, Membrane Technology and Research, Inc. (MTR), to develop highly efficient membrane-based and hybrid distillation-membrane processes for recovery of biofuel alcohols from dilute fermentation broths. During the proposed project, we will provide technical support and facilities to the Algenol-led team that will enable: the identification and implementation of efficient separation processes; the evaluation of such separation processes in our facilities or other project locations; access to our extensive know-how related to design and performance of membrane-based and other innovative separation processes; and the identification of scale-up and life cycle issues related to the algae-based process.

In order to assist your efforts, we are prepared to obligate two members of our separations group, Dr.

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We look forward to the opportunity to partner with Algenol and the other collaborators on this project.

Sincerely,

Douglas Young

Douglas Young, Ph.D.
Chief, Clean Processes Branch
Sustainable Technology Division

Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393

May 26, 2009

Mr. Hank Eggink
Contracting Officer
U.S. Department of Energy
Golden Field Office
Mail Stop 1501
1617 Cole Boulevard
Golden, Colorado 80401
Phone: 303-275-4825
Fax: 303-275-4858

Re: DOE Funding Opportunity Announcement, Recovery Act – Demonstration of Integrated Biorefinery Operations, No. DE-FOA-0000096

Dear Mr. Eggink:

Authorization is granted for the National Bioenergy Center of the National Renewable Energy Laboratory to assist Algenol Biofuels, Inc., with a simulated laboratory analysis of natural gas power plant flue gas and its impacts on Algenol cyanobacteria samples, as well as development of an Aspen Plus technoeconomic model for the Algenol algae-to-ethanol production process for the above-cited solicitation. The proposed work is consistent with, or complementary to, the missions of the laboratory and will not adversely impact execution of the laboratory's DOE-assigned programs.

Sincerely yours,

Jean M. Siekerka
Contracting Officer

Cc:
Phil Pienkos, NREL

Federal Recycling Program Printed on Recycled Paper

Applicant Name: Georgia Institute of Technology - Cumulative Award Number:

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. DE - FOA - 0000096	81.087			$912,040		
2.						
3.						
4.						
5. Totals		$0	$0	$912,040		

Exemption 4

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity (1) DE - FOA - 0000096	(2)	(3)	(4)	Total (5)
a. Personnel *					
b. Fringe Benefits *					
c. Travel *					
d. Equipment					
e. Supplies *					
f. Contractual University of Colorado (***GTchgs O/H on 1st $25K of contract year 1 only**)					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges (51%) (* indicates eligible for O/H)					
k. **Totals** (sum of 6i-6j)					
7. Program Income					$0

Exemption 4

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Section C - Non-Federal Resources

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) **Totals**
8. DE - FOA - 0000096		Exemption 4		
9.				
10.				
11.				
12. **Total** (sum of lines 8 - 11)	$0			

Section D - Forecasted Cash Needs

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$484,400	$154,398	$117,802	$117,802	$94,398
14. Non-Federal	Exemption 4				
15. **Total** (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project

	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. DE - FOA - 0000096	$427,600			
17.				
18.				
19.				
20. **Total** (sum of lines 16-19)	$427,600	$0	$0	$0

Section F - Other Budget Information

21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Georgia Institute of Technology - Year1 Award Number:

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. DE - FOA - 0000096	81.087			$484,400	Exemption 4	
2.						
3.						
4.						
5. Totals		$0	$0	$484,400		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	(1) DE - FOA - 0000096	(2)	(3)	(4)	
a. Personnel *	Exemption 4				
b. Fringe Benefits *					
c. Travel *					
d. Equipment					
e. Supplies *					
f. Contractual University of Colorado (***GTchgs O/H on 1st $25K of contract year 1 only**)					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges (51%) (* indicates eligible for O/H)					
k. **Totals** (sum of 6i-6j)					
7. Program Income					$0

Previous Edition Usable

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Section C - Non-Federal Resources

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) **Totals**
8. DE - FOA - 0000096		Exemption 4		
9.				
10.				
11.				
12. **Total** (sum of lines 8 - 11)	$0			

Section D - Forecasted Cash Needs

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$484,400	$154,398	$117,802	$117,802	$94,398
14. Non-Federal		Exemption 4			
15. **Total** (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project

	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. DE - FOA - 0000096	$427,600			
17.				
18.				
19.				
20. **Total** (sum of lines 16-19)	$427,600	$0	$0	$0

Section F - Other Budget Information

21. Direct Charges	22. Indirect Charges

23. Remarks

Applicant Name: Georgia Institute of Technology - Year 2 Award Number:

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. DE - FOA - 0000096	81.087			$427,640	Exemption 4	
2.						
3.						
4.						
5. Totals		$0	$0	$427,640		

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	(1) DE - FOA - 0000096	(2)	(3)	(4)	
a. Personnel	Exemption 4				
b. Fringe Benefits					
c. Travel					
d. Equipment (see below)					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges (51%)					
Equipment (no indirect costs)					
Subcontract (University of Colorado)					
k. **Totals** (sum of 6i-6j)					
7. Program Income					$0

SF-424A (Rev. 4-92)

Section C - Non-Federal Resources					
(a) Grant Program		(b) Applicant	(c) State	(d) Other Sources	(e) **Totals**
8. DE - GOA - 0000096			Exemption 4		
9.					
10.					
11.					
12. **Total** (sum of lines 8 - 11)		$0			

Section D - Forecasted Cash Needs					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$484,400	$154,398	$117,802	$117,802	$94,398
14. Non-Federal	Exemption 4				
15. **Total** (sum of lines 13 and 14)					

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project				
	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16.				
17.				
18.				
19.				
20. **Total** (sum of lines 16-19)	$0	$0	$0	$0

Section F - Other Budget Information	
21. Direct Charges	22. Indirect Charges
23. Remarks	

Georgia Institute of Technology
The Strategic Energy Institute

May 21, 2009

Algenol Biofuels Inc.
Craig R. Smith, M.D.
Executive Vice President, Chief Operating Officer
28100 Bonita Grande Drive, Suite 200
Bonita Springs FL 34135

Subject: "Pilot-Scale Integrated Biorefinery Operations for Producing Ethanol From Algae"

Dear Dr. Smith,

The purpose of this letter is to confirm our support for and participation in the project **"Pilot-Scale Integrated Biorefinery Operations for Producing Ethanol From Algae,"** which will be submitted as a proposal to the US Department of Energy under Funding Opportunity DE-PS36-09GO99038.

As you know, the Georgia Institute of Technology (GT) has significant experience and expertise in renewable energy research, particularly within in our Strategic Energy Institute and our School of Chemical & Biolmolecular Engineering. We believe our background in CO_2 capture, membrane separations, and energy systems analysis will help the Algenol-led team to successfully complete the project.

Georgia Tech will be a significant collaborator in the R&D component of the project. Specifically, Georgia Tech researchers will:

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The Strategic Energy Institute
Atlanta, Georgia 30332-0362 U.S.A.
Phone: 404•385•0384
Fax: 404•894•7896
web site: http://www.energy.gatech.edu

A Unit of the University System of Georgia
An Equal Education and Employment Opportunity Institution

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We here at Georgia Tech look forward to working with you and the distinguished team that Algenol has assembled to successfully complete the goals of this project and prepare the technology for commercialization.

Sincerely,

Roger P. Webb, PhD.
Director, Strategic Energy Institute

The Strategic Energy Institute
Atlanta, Georgia 30332-0362 U.S.A.
Phone: 404•385•0384
Fax: 404•894•7896
web site: http://www.energy.gatech.edu

A Unit of the University System of Georgia

An Equal Education and Employment Opportunity Institution

Algenol Lifecycle Energy and Greenhouse Gas Emissions

Exemption 4 *

Georgia Institute of Technology

June 16, 2009

*Principal Investigators

Proprietary Information: All information in this document is proprietary. Algenol Biofuels requests all information in this document not be released to persons outside the Government, except for the purposes of review and evaluation.

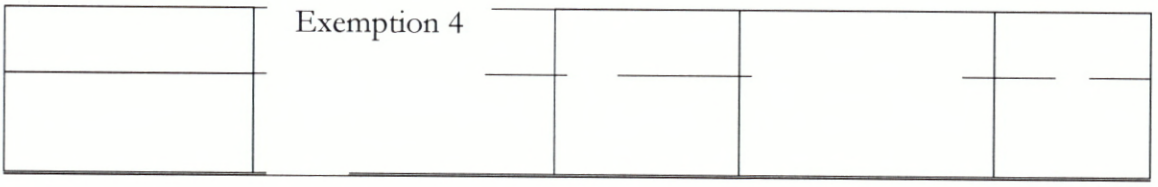
1. Introduction

This report is a summary of the lifecycle energy and greenhouse gas emissions of the Algenol ethanol production system. The Algenol system aims at large-scale fuel ethanol production using genetically enhanced photoautotrophic cyanobacteria (algae). This analysis applies to the current vision of a full-scale commercial system.

Exemption 4

Table 1. LCA Data and Sources

Stage	Content	Data	Unit	Reference
Exemption 4				



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