

Overview of Environmental Report Guidance

BRS NEPA Team
July 14, 2011

Purpose of Guidance

- Provide information on the preparation of environmental reports
 - Environmental reports are voluntary
 - Used by APHIS to help prepare NEPA documents
 - Can be submitted at anytime prior to APHIS initiating the NEPA analysis for a petition

What is an Environmental Report?



- An ER is a technical report that helps the agency to complete a NEPA analysis
- Not an Environmental Assessment (EA)
 - Describes the subject of the petition and its use in the environment
 - It compares the current agroecosystem with one that includes the use of the GE organism that is the subject of the petition



Sections of ER



Purpose and Need for the GE organism

Action

Action Area

Affected Environment

Alternatives

Environmental Consequences

Cumulative Impacts

Scoping the Issues



- Each petition is unique
 - Scoping identifies the issues related to this petition
- Issues in previous EAs can inform scope
- Not all issues in previous EAs may apply

Ways to Scope

- Use the market data that prompted you to develop that product.
- Look at previous petitions for similar products. What was covered in the EA? What types of public comments were received?
- Read the literature. What issues are being raised in the scientific community? Are any of these issues controversial within the scientific community?
- Talk to growers, processors, extension agents, or other people who may be interested in using the product, or may have concerns about its use.
- Read the news, blogs, websites, etc. to gauge public interest in product.



Developing the Report

- Balance
- Balance
- Balance



Supported by current scientific
data and literature

Purpose and Need for the GE Organism



What “problem” does it solve?



Action

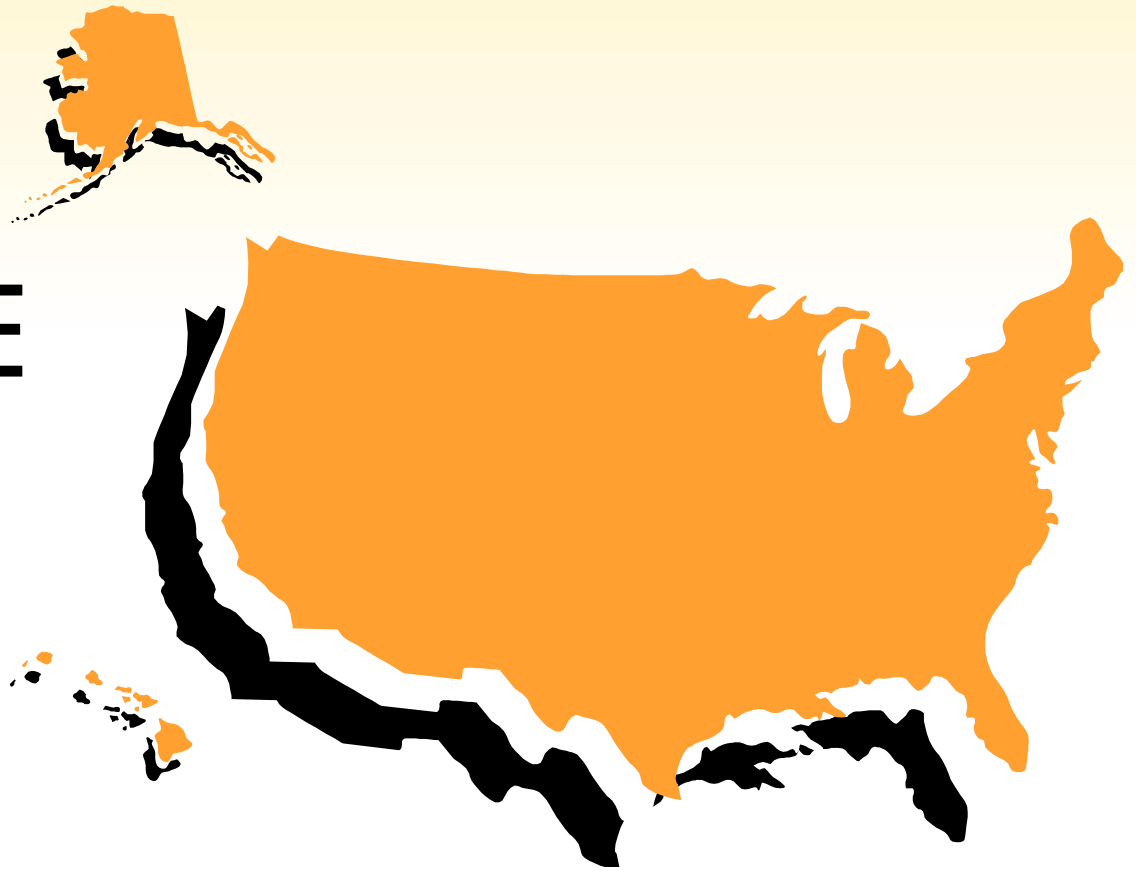
What is
the action
requested
in the
petition?



Action Area



Where
will the GE
crop be
grown?



Affected Environment



The affected environment is a description of the receiving environment where the GE organisms will be grown.



Alternatives

- Action requested in petition
- No action alternative





Environmental Consequences



- Compare the potential impacts from approving the petition to the impacts from not approving the petition.
- Identify methods and the assumptions.
- Support with references and data.



Cumulative Impacts



- "Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

(40 CFR 1508.7)

Technical Suggestions

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Technical suggestions



1. Utilize the ER template if possible.
 - MS Word template will be provided.

Why?

- a. Automates formatting upon text entry.
- b. Provides general outline of ER structure.
- c. Ease of utilizing ER sections.



Technical suggestions



2. Utilize Endnote X4 for reference/citation management.

- Reference types will be provided.
- Output style will be provided.

Why?

- a. Ease of reference organization and sharing (BRS uses Endnote X4).
- b. Allows attachment of relevant files (e.g., PDFs) for each cited reference.
- c. Automates citation/bibliography formatting.



Technical suggestions



3. Provide PDFs of cited references and highlight relevant text or data in these PDFs.
 - Most journal articles are available as PDFs; highlighting text is a feature in the free version of Adobe Acrobat PDF reader.
 - PDFs may be attached to respective reference citations in Endnote X4.

Why?

- a. Expedites fact checking by BRS.

Technical suggestions



4. Provide original files for figures and tables utilized in the ER.

Figures:

- a. Unflattened figures if generated in Adobe Photoshop or Illustrator.
- b. Original, high resolution figures.

Tables:

- a. Provide original data that was used to generate table numbers if reproduced from a journal article, database output, etc.
- b. Original file format used to generated table (e.g., .xls)

Technical suggestions



4. Provide original files for figures and tables utilized in the ER.

Why?

- a. Ease of figure or table reproduction if BRS decides to do so in the NEPA document.



Technical suggestions



5. Provide final ER as word document (or equivalent) and PDF file.

Why?

- a. Redundancy against any read errors.
- b. Word document allows ease of copying and pasting between documents.
- c. PDF format as a final record that is stripped of any formatting capability.



Agricultural Production Practices

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Overview of Agricultural Production



- Land use.
- General production.
 - Tillage.
 - Pesticide use.
 - Disease and pest management.
- Specialty markets.
 - Organic markets.
- Any other relevant topics.



Land Use

affected environment



- Where is crop grown?
- How many acres?
- What proportion of the agricultural land is planted in this crop?
 - Is it a major or a minor crop?
- What crop or land use might be displaced?
 - Consider regional differences.

Land Use

environmental consequences



- Analyze no action alternative.
 - Trends in crop-related land use.
 - Acreage increasing/decreasing.
 - What is influencing trend?
 - Alternative land uses?
- Compare approving the petition.
 - Will trends change? How?
 - Consider scale and magnitude.

General Production



1. If there is no anticipated change to agronomic practices, then a single general production section should suffice.
2. If there is an anticipated change to a specific agronomic practice (tillage, pesticide use, disease and pest management), then a discreet section for that specific practice is recommended.

General Production

affected environment



- Annual or perennial?
- When is the crop typically planted/harvested?
 - Does planting or harvesting time vary by region?
 - What are typical yields?
- What types of cultivation practices are used?
 - Disease and pest management?
 - Are cover/rotation crops used?
 - Do these practices vary by region?
- Are the seed crop and the commodity crop produced differently?



General production *environmental consequences*



- Analyze no action alternative.
 - Trends in production techniques or characteristics.
 - Harvest time, age to maturity, yield, fertilizer use
 - What is influencing production?
- Compare approving the petition.
 - Will trends change? How?
 - Consider scale and magnitude.



Tillage

affected environment



- Discuss how tillage is currently used.
 - Is conservation tillage employed?
 - On what percent of the acres is conservation tillage used?
 - What types of conservation tillage are used?
- Include discussion if there is an expected change between the alternatives.



Tillage

environmental consequences



- Analyze current tillage trends for the crop (no action alternative).
 - What is influencing the current trends.
- Compare approving the petition.
 - Will trends change? How?
 - Consider scale and magnitude.



Pesticide Use

affected environment

Describes pesticide use on the currently available (conventional and/or GE) varieties.

- Weeds, insects, and microbial.



Pesticide Use

environmental consequences



- Establish current pesticide use for the available varieties of the crop (no action alternative).
 - Analyze the trends in use.
 - Consider what is influencing the trends.
- Compare approving the petition.
 - Will trends change? How?



Disease or Pest Management *affected environment*

Discuss management practices used to control pests and diseases focusing on the target pest or disease as is appropriate.



Disease or Pest Management *environmental consequences*



- Establish the current disease or pest pressures for the available varieties (no action alternative).
 - Local, regional, or national?
 - Trends and management outcome of disease or pest pressure?
- Compare approving the petition.
 - Will trends change? How?
 - Will the management outcomes change? How?



Specialty markets *affected environment*



- Describe the current production practices and post-harvest isolation and processing protocols for that market.
 - Establish the current production trends for the crop used in the specialty market.
 - Include common methods for managing gene flow in the crop, if applicable.
 - Discuss any differences in the land use associated with the specialty crop.



Specialty markets

environmental consequences



- Analyze the effectiveness of production practices for meeting the desired goal (no action alternative).
- Compare approving the petition.
 - Will management practices change? How?
 - If they will not change, will the current practices be adequate to meet the desired goals?
 - If the practices will change, how will these changes contribute to meeting the desired goal?
 - Consider scale and magnitude.



Organic Production *affected environment*



- Describe the acreage cultivated (where and how much).
 - Past and present trends.
- Techniques used in organic production, including methods for purity maintenance.



Organic Production

environmental consequences



- Examine how currently available varieties of the crop and their production affect organic production (no action alternative).
 - Production trends, regional or national as necessary.
- Examine how approving the petition affects these trends.
 - Consider magnitude and scale.

Biological Resources

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Overview Biological Resources



- Plants
- Animals
- Microorganisms
- Biodiversity




Animals

affected environment



- Animals associated directly or indirectly with crop
 - Vertebrate animals
 - Invertebrate animals
 - Pests
 - Beneficials
 - Others?



Animals

affected environment



- How do animals use the crop or surrounding areas?
 - Eat it?
 - Live in it?
 - Hunt in it?



Animals

environmental consequences



- Establish baseline for crop animal interactions
 - Direct impacts
 - Indirect impacts
 - Identify important regional differences
- Compare GE crop to baseline
 - How do the interactions change?
 - Direct impacts
 - Indirect impacts
 - Characterize scale and magnitude

Animals

environmental consequences

- Will the GE crop change the interaction with a pest animal?
- Will the GE crop affect animals that consume it?
- Will the GE crop (directly or indirectly) change the crop's suitability for use as a habitat?



Plants

affected environment



- What plants are associated with the crop?
 - Weeds?
 - Surrounding area?
 - Does this vary by region?
- What plants (if any) can interbreed with the crop plants?
 - Frequency?
 - Fertile progeny?

Plants

environmental consequences

- Establish a baseline for how plants are effected by currently available varieties
 - Direct effects
 - Indirect effects
- Compare GE crop to baseline
 - How do the interactions change?
 - Direct impacts
 - Indirect impacts
 - Characterize scale and magnitude

Plants

environmental consequences



- How will the introduction of the GE crop affect native or naturalized plants with which it can interbreed, compared to the current varieties?
- How will it affect weed plants, compared to the current varieties?
 - Consider the plant and its production practices
- How will it affect neighboring plants, compared to the current varieties?
 - Consider the plant and its production practices



Microbes

affected environment



- Are there microorganisms that interact with the crop?
 - Diseases
 - Beneficial
 - Focus on important interactions
 - Focus on interactions that may change with the introduction of the GE crop



Microbes

environmental consequences



- Establish a baseline for how microbes are affected by currently available varieties
 - Direct effects
 - Indirect effects
- Compare GE crop to baseline
 - How do the interactions change?
 - Direct impacts
 - Indirect impacts
 - Characterize scale and magnitude

Microbes

environmental consequences



- Does the GE crop affect diseases or pests that vector diseases differently from currently available varieties?
 - Directly or indirectly
- Does the GE crop affect beneficial microbes differently than currently available varieties?
 - Directly or indirectly



Biodiversity

affected environment



- Describe the biodiversity typically associated with the crop
 - Focus on local or regional difference of note
 - Look at within field biodiversity and adjacent land biodiversity
 - Think about stable and transient interaction of organisms in the agricultural ecosystem

Biodiversity

environmental consequences



- Establish a baseline for how biodiversity is affected by currently available varieties
 - Direct effects
 - Indirect effects
- Compare GE crop to baseline
 - How do the interactions change?
 - Direct impacts
 - Indirect impacts
 - Characterize scale and magnitude



Biodiversity

environmental consequences



- Will production practices change in a way that affects biodiversity in or around the planting area?
- Will the GE organism be grown in new areas or change land use? If so how might this change affect biodiversity?

Physical Environment

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Content of Physical Environment



- Soil Quality (or other Geological Resources)
- Water Quality or Quantity
- Air Quality
- Climate and the Crop
- Energy Resources




Soil Quality

Affected Environment



- General types of soil favorable to production of this crop?
- Does soil influence cultivation practices in different regions?
- Soil erosion and tillage methods practiced by producers?
- Soil constituents: minerals, microbiota, and possible relationships with the crop or production methods?



Soil Quality

Environmental Consequences



- **No Action Alternative**
 - Any trends in tillage methods for the crop?
 - Any soil impacts of current production methods?
 - Is any factor driving production changes?
- **Alternative: Approve the Petition**
 - Will new production methods result in changes in soil erosion?
 - Will use of herbicides be favored, and result in fewer tillage passes?
 - Will the crop use herbicides having less soil environmental impact?

Water Quality or Quantity

Affected Environment



- Water requirements of the crop?
- Differences in water requirements in different areas of crop production?
- Ground water or surface water used in which areas?
- Erosion, water leaching and runoff potential? (In relation to tillage frequency?)
- Nitrogen/phosphorus and pesticides in runoff?
- Water, soil character may determine root morphology and soil impacts?

Water Quality or Quantity

Environmental Consequences



- No Action Alternative
 - Any trends in water use?
 - Expected differences in runoff potential between available varieties and proposed variety with their associated production methods?
 - Any issues of nitrogen or pesticide leaching or runoff differing between available crops?
 - Influences that may lead to water quality changes?

Water Quality or Quantity

Environmental Consequences



- **Alternative: Approve the Petition**
 - Will new water requirements accompany the proposed crop?
 - Will anticipated new tillage procedures result in more (or less) runoff?
 - Any expected changes in pesticide content or nitrogen in surface waters?
 - Other production changes expected that would change water needs of the crops?



Air Quality

Affected Environment



- Production practices and particulate production, chemical volatilization?
- Aerial applications of pesticides? Drift and diffusion issues?
- Any direct consequences of the crop on air resources?



Air Quality

Environmental Consequences



- **No Action Alternative**
 - Any trends towards new production technologies?
 - Anything influencing the changes?
 - New trends in pesticide use?
- **Alternative: Approve the Petition**
 - Will less dust be generated because the crop facilitates use of conservation tillage and herbicides?
 - Will fewer pesticides be used with the new variety than the existing ones?
 - Will the crop require less use of farm machinery and result in fewer emissions of GHGs?



Climate and the Crop

Affected Environment



- Do crops influence climate change?
GHG changes resulting from:
 - Specific crop production?
 - Rotation crops?
 - Production practices and farm equipment use?
 - Relative importance of CO₂, N₂O output?
 - High capacity to sequester carbon?
- How will climate change impact crops and production?
 - What are the broad trends and consequences of climate change for various crop production regions?

Climate and the Crop

Environmental Consequences



- **No Action Alternative**

- Existing climate trends and future impacts on crops
- Contributions of present crops to climate change

- **Alternative: Approve the Petition**

- Will climate change lead to replacing other varieties or crops in the affected area?
- Will climate change lead to replacing other crops in another region with the proposed crop?
- What crops would be at risk of significant changes in acreage?



Energy Resources

Affected Environment



- What impacts on the physical environment have been observed so far with this bioenergy crop?
- Are there other (bioenergy) crops that might be grown in the same region likely to impact similar physical resources?
[Possible cumulative impact]



Energy Resources

Environmental Consequences



- No Action Alternative
 - Present trends in energy crops and overall impacts on the physical environment?
- Alternative: Approve the Petition
 - Will the proposed crop place new demands or impacts on any other physical environment resource from which other energy crops will also draw?
 - Will production of the variety provide benefits of additional carbon sequestration beyond its usefulness for energy production (i.e., less CO₂ evolved when comparable amounts of coal-derived energy are combusted)?
 - Will any other energy resource be impacted by production of this crop?



Case 1. Corn with Glyphosate Tolerance

- Discuss possible impacts for each Resource Area
 - Water Quality or Quantity
 - Soil Quality
 - Air Quality
 - Climate Change and the Crop



Case 2. Switchgrass with Drought Tolerance, Nitrogen Use Efficiency and Sterility



- Discuss possible impacts for each Resource Area
 - Water Quality or Quantity
 - Soil Quality
 - Air Quality
 - Climate Change and the Crop



Human and Animal Health

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United States Department of Agriculture
Animal and Plant Health Inspection Service



**Biotechnology
Regulatory
Services**



Human Health



- **Public or Consumer Health**
 - Primarily ingestion of GE crop (maybe other exposure pathways depending on uses of the crop)
- **Worker or Occupational Health**
 - Exposure (ingestion, dermal, inhalation) to the crop in field, during processing, etc.
 - Worker safety during production or processing
 - Exposure during or after pesticide application (ingestion, inhalation, and dermal)

Public or Consumer Health *affected environment*

- What types of products derived from the GE crop?
- Is the crop currently consumed by people (non-GE, GE, or organic)?
- Certain parts of the crop only used in food products?
- Quantities of the crop (non-GE, GE, or organic) currently consumed
- Future trends/demands



Public or Consumer Health *affected environment*



- Other GE crops approved/consumed?
 - Similar traits?
 - Approved tolerances
 - Toxicity/allergenicity
- If not an ingestible crop, how may people be exposed to the crop?
- Specific pesticides currently used on crop?



Public or Consumer Health *environmental consequences*



- No Action Alternative
 - Continue as regulated article
 - Provides baseline for comparison
 - Any change in consumer exposure from existing traditional or GE crops?
 - FDA approval?
 - Toxicity data
 - Allergenicity
 - Nutritional data
 - History of safe use in food and feed
 - EPA restrictions or approvals?



Public or Consumer Health *environmental consequences*



- Alternative: Approve the Petition
 - Increase GE crop consumption?
 - FDA consultations/approvals
 - EPA approvals or limitations
 - Effects of introduced protein
 - Pesticide residues/tolerances
 - Existing or new use (crop or application rates)?
 - Toxicity
 - EPA evaluation/calculations

Worker Health and Safety *affected environment*



- How does production of the currently available varieties of the crop directly/indirectly affect worker health?
- Relevant processing or production practices related to the crop that effect worker health
 - How do workers interact with the crop?
 - Safety hazards/risks?
 - Allergy issues?
 - Current pesticide use on the crop and worker exposure?



Worker Health and Safety *environmental consequences*



- No Action Alternative

- Continue as regulated article
- Provides baseline for comparison
- Any change in worker exposure anticipated from existing traditional or GE crops?
- Trends in pesticide use?
 - Increase or decrease (volume, application rates)?
 - Shift in use from one type (i.e., active ingredient) to another?



Worker Health and Safety *environmental consequences*



- Alternative: Approve the Petition
 - Introduction of the new GE variety direct and indirect impacts worker health
 - Changes in production or processing with approval of the petition?
 - Decrease/increase in hazards?
 - Exposure to introduced protein
 - Changes in pesticide use?



Livestock Health *affected environment*



- Crop varieties currently used as feed (non-GE, GE, organic)?
- What parts of the crop used in feed?
- What domestic animals are fed the crop?
- Quantities for each group of livestock fed?
- Future trends/demands
- If the new GE crop has altered composition, discuss the existing varieties with respect to those components that will change
- Compare the new GE organism to those that are currently available



Livestock Health *environmental consequences*



- No Action Alternative
 - Continue as regulated article
 - Provides baseline for comparison
 - FDA approval for feed?
 - Nutritional data
 - Toxicity data
 - History of safe use of inserted protein(s) in feed
 - Future trends/demands



Livestock Health

environmental consequences




- Alternative: Approve the Petition
 - Introduction of the new GE variety direct and indirect impacts on animal health
 - Replace current GE or traditional varieties used as feed?
 - Effects of the genetic modification in the plant on livestock that might consume it?
 - Toxicity data
 - History of safe use in food and feed?
 - Nutritional changes?
 - Changes in pesticide tolerances (i.e., forage/hay)?



Case 1. Corn with Glyphosate Tolerance

- Discuss possible impacts for each Resource Area
 - Consumer Health
 - Worker Health
 - Livestock Health



Case 2. Switchgrass with Drought Tolerance, Nitrogen Use Efficiency and Sterility



- Discuss possible impacts for each Resource Area
 - Consumer Health
 - Worker Health
 - Livestock Health



Socioeconomic Analysis

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Socioeconomic Effects



- Domestic socioeconomic environment
 - Uses of the crop in the US economy
 - Specialty markets and value added crops
 - Organic industry
 - Cultural preferences

- Export markets

Domestic Socioeconomic Environment

affected environment

- Describe how the crop is typically incorporated into commerce
 - Sold for domestic use?
 - Values of these markets?
- Are there specialty markets for the crop?
 - Locations?
 - Regional or demographic differences?

Domestic Socioeconomic Environment

affected environment cont'd

- Is there an organic sector?
 - Location?
 - Value?
 - Structure?
- Social or cultural preferences associated with the crop?

Domestic Socioeconomic Environment

environmental consequences

- Analyze trends in commerce
- Analyze trends in the values of the markets
- If you identified an associated organic industry crop, analyze the current trends...how much is organic, look at regional differences in the production and marketing.

Domestic Socioeconomic Environment

environmental consequences

- Discuss any associated demographic or regional preferences
- If you identified social or cultural preferences, analyze the impact of the current varieties.
 - If appropriate, look at regional differences in these preferences.

Domestic Socioeconomic Environment

environmental consequences

- Analyze effect on each of the identified market segments. If seed and commodity crop production are regionally segregated, look at the effect of each on the relevant sectors.
- Consider how to present this analysis...focus on overall value, net return to grower, or reductions in input costs. Use the measure that is most appropriate to the analysis.

Domestic Socioeconomic Environment *environmental consequences*

- Compare the effects of introducing the subject of the petition to the no action alternative
- Characterize the scale of any effects and the magnitude of the effect



Export Markets

affected environment



- Is this crop exported?
 - Value of the market?
 - GE crop approved in other countries?
 - Major export markets in which it has not been approved?
 - Markets that are sensitive to GE traits?
 - Practices currently used to address those sensitivities?



Export Markets

environmental consequences



- Characterize the export markets for the crop and currently available varieties.
 - Regions exported to?
 - Trends in the markets?
 - If any markets are GE sensitive, identify processes or procedures used or thresholds used in testing for the markets.

Export Markets

environmental consequences cont'd

- Analyze how the new GE variety may impact the important export markets
 - Discuss applications for regulatory approvals and for those received in other countries and the effect of these approvals on exports.
 - Characterize the magnitude of any impacts