

A Life-Giving Approach (LGA)

Protect all creation and
prevent environmental accidents

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Overview

Concerned with rash of recent
environmental accidents

Review how some of these accidents could
have been avoided by applying established
industrial standards

Propose standards and measurements to
protect all of creation and comply with
The Earth Charter

LGA

(Life Giving Approach)

Aimed at preserving, not only human life, but all of creation

My term incorporating policies established and included in some/all of the following standards:

- FMEA
- LOAEL
- EPA
- Precautionary Principle
- Bible and ethics

LGA

FMEA – Failure Modes and Effect Analysis

- established in the 1950s
- don't repeat past mistakes by looking at history
- look at null (de-energized state)
- establishing regulations to prevent reoccurrence

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LOAEL– **L**owest **O**bserved **A**ctual **E**ffect **L**evel

- Established by ATSDR (Agency for Toxic Substance and Disease Registry, a division of the U.S. Department of Health)
- Lowest reported level of toxicity for various pollutants affecting the environment
- Protects humans with good safety margin
- Protects animals in environment

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EPA – U.S. **E**nvironmental **P**rotection **A**gency

- Focusing specifically on the “Rapid Bioassessment Protocol for use in streams and wadeable rivers”
- Established test method to measure and quantify impact on aquatic life

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Precautionary Principle

- The burden of proof that an action is not harmful falls on those taking that action.
- Adopted by United Nations General Assembly in 1982, and is part of the law of the European Union

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Bible and Ethics

Matthew 10:29-31 — What is the price of a pet canary? Some loose change, right? And God cares what happens to it even more than you do. He pays even greater attention to you, down to the last detail—even numbering the hairs on your head.

Job 12: 7-12 But ask the animals what they think—let them teach you; let the birds tell you what’s going on. Put your ear to the earth—learn the basics. Listen—the fish in the ocean will tell you their stories. Isn’t it clear that they all know and agree that GOD is sovereign, that he holds all things in his hand — Every living soul, Yes, every breathing creature? Isn’t this all just common sense, as common as the sense of taste?

Rasmussen — The ethic we need: “respect earth and life in all its diversity”
from *Earth Honoring Faith*, p. 141

LGA

(Life Giving Approach)

Pollution definition

- “The release of a substance into the environment in quantities or rates that cannot be processed by natural systems.”
- Ref: Peter Sawtell, Eco-Justice Ministries

Standards

- Below LOAEL
- Test
 - Measurement
 - EPA Rapid bioassay

Best Design Principles = LGA Approach

- FMEA
- LOAEL
- EPA
- Precautionary Principle
- Bible and ethics

Examples of applying LGA safety criteria

Design Criteria for Luxembourg Project

- Goals:
 - zero injuries and environmental accidents
 - zero repetition of past mistakes
 - utilize proven technology
 - maintain process throughout life of plant
- Root-cause analysis of past problems
- Follow FMEA procedures
(Failure Mode & Effects Analysis)
- Equipment design exceeds operating conditions

Example: Introduction of CFCs in Luxembourg

- Theory: ozone hole + CFCs
- Question: should new plant be built?
- Decision to build plant depended on:
 - Approval from residents of adjacent town
 - Lux government had to issue permits
 - Trees cut for plant were replaced 3x
 - Plant was built on stilts to protect ground water
- After 10 years, duPont replaced CFCs

Greenpeace Is Active



Planning for Explosions

Hagley Museum, Delaware ~ 1802



Possible blast produced from mixing explosives will be released through the weak wall (sloping roof) for minimum damage – (current industry best practice)

Excellent Work

(Do not repeat past mistakes)

National Transportation Safety Board (NTSB)

- Independent
- Root cause of accidents
- Works to prevent future accidents.



National Highway Transportation Safety Board (NHTSA)

- Global leader in motor vehicle & highway safety



Office of Water Quality

National and Local Agencies



U.S. Environmental Protection Agency

Watershed Academy Web

Distance Learning Modules on Watershed Management
<http://www.epa.gov/watertrain>

Rapid Biological Assessment Protocols: An Introduction



2002-2003 Assessment of the
Biology, Habitat and
Chemistry of Select Streams
and Watersheds of
Chesterfield County, Virginia



Falling Creek at Coghill Road

Chesterfield County
Office of Water Quality

Compiled August 2004

Numeric Standards

Uranium

- LOAEL = $2\mu\text{g/L}$ (2 ppb)
- WHO = $2\mu\text{g/L}$ (= LOAEL)
- EPA = $30\mu\text{g/L}$ (30 ppb)

- Note: 5000 uranium mines west of Mississippi; none meet even EPA standards

Coal Mining (air)

- NIOSH = 1 mg/m^3 (10 hr/day, 40 hr/wk)
- DMM = 2 mg/m^3
- US Congress (2003) = 8 mg/m^3
 - no 24/7 testing
 - # tests/yr reduced from 30 to 2
 - Allows tax write-off for black lung disease

LGA

(Life Giving Approach)

Pollution

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- Peter Sawtell, Eco-Justice Ministries

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Examples of how
LGA safety criteria
could have prevented accidents.

Wrong Analysis

Spain investigators: Train driver was on phone – Europe news – Boston.com

Spain investigators: Train driver was on phone

By JORGE SAINZ and BARRY HATTON / Associated Press / July 30, 2013

Brakes needed to be applied four miles
before the turn.

Use safety interlocks to automate the process
if driver fails to act.

Bad Design

National & World News

Railway blames engineer for Quebec disaster

THE ASSOCIATED PRESS | Posted: Thursday, July 11, 2013 12:00 am



The death toll from the Lac-Mégantic, Quebec, oil tanker explosions and derailment rose Wednesday to 20. An additional 30 people are missing and presumed dead.

- **Brake Failure: cause of accident**
- Engine off
- No air brakes
- Proper design:
 - brakes on normally
 - engine air to release brakes and allow train to move

Bad Management



Miner's boots and lunch pail
Memorial Service for Miners

Underground mining (Upper Big Branch Mine, WV)

- 66,000 federal violations
- Key instruments monitoring methane were off.
- Explosions kill 39
 - methane
 - natural gas
 - coal dust
- Explosions could have been prevented

Inadequate Laws

Mountain top removal



No limits on amount of earth dumped in streams
No tests to evaluate effects on animals in streams

Run to Failure

1. Amtrak dining car – RVR
2. Kitchen gas oven
3. Pegasus pipeline,
Mayflower, AR

- Pipeline statistics –
US DOT: PHMSA
(Pipeline & Haz Mat
Safety Admin)
 - total spills/yr = 127 (last
three years)
 - >5 M gal/yr (120K bbl/yr)

Crack 22 ft. long x 2 inches wide



Exxon's Pegasus pipeline rupture/Credit:
Duncan Firm

Bad Design: Keystone Pipeline

Design is weak, defective

Run-to-failure operation

- cleanup affects irrigation H₂O

Safety factor only 25%

(= accuracy of calcs)

Capacity = 830M bbl/day

36" Dia, 20 mi between valves + 1 hr
response time = spill 1.5B gal

Dilbit – requires special
cleanup

Water has priority over oil



Bad Land-use Planning



Impact affected:

- Fertilizer facility
- Middle school
- Elementary school
- Rest home

Map of
West, Texas,
Explosion

More Bad Planning (plan for worst case)



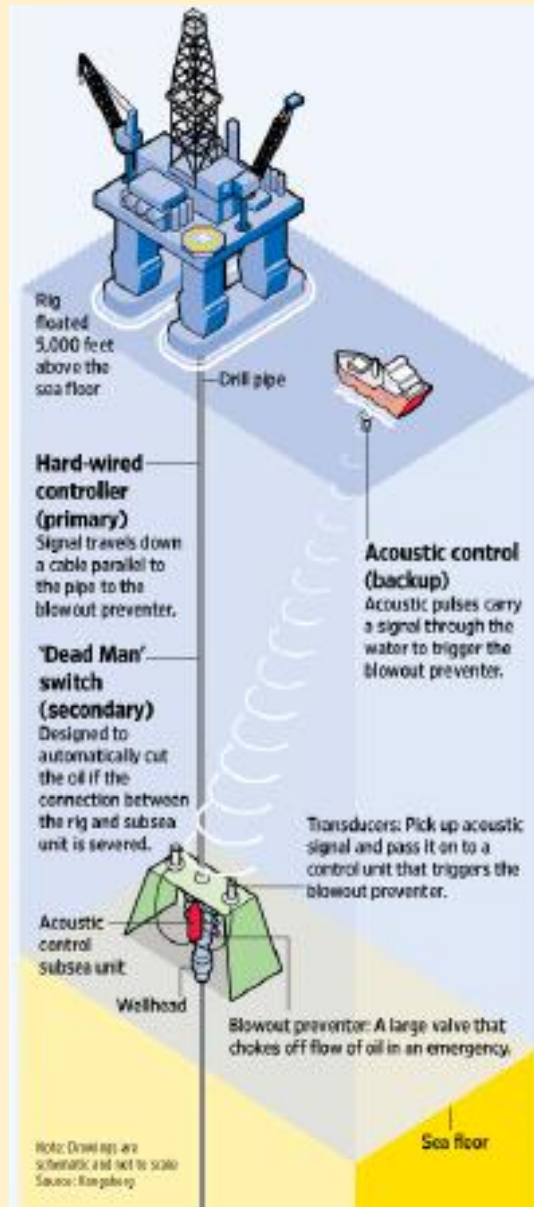
Firefighters walk through an area of exploded propane cylinders in the aftermath of an explosion and fire at a propane gas company, Tuesday, July 30, 2013, in Tavares, Fla. Eight people were injured, with at least three in critical condition. John Herrell of the Lake County Sheriff's Office said early Tuesday there were no fatalities despite massive blasts that ripped through the Blue Rhino propane plant late Monday night. (AP Photo/John Raboux)

TAVARES, Fla. (AP) — After hearing two explosions, maintenance worker Gene

- Propane gas co.
- Landfills
 - Fires – ASR
 - Explosion – anaerobic conversion to electricity
 - Not near homes
 - VDH high risk for water quality issues within 5 miles of public water source.

No Testing of Safety Devices

BP Oil Spill



Wall Street Journal

- Government regulations do NOT require testing of blow-out-preventer valve
- Safety management procedures require routine testing of safety equipment
- Valve failure led to major oil spill in Gulf of Mexico

Laws Not Enforced

VA Road Construction Runoff



Photo by Dean Hawthorne, 4 Nov. 2002

Laws Not Enforced

VA Road Construction Runoff



Photo by Dean Hawthorne, 4 Nov. 2002

- Pollution from 3 miles away (violates law)
 - 200 lb/Ac phosphorus
 - 150 lb/Ac nitrogen
 - 75 tons/Ac sediment
- Sediment controls
 - 10 violations
 - Do not work in local soils
- Animals not happy either

Sediment Controls Do Not Stop Pollutants



Silt Fence

Turbidity Curtain



Sediment Controls Do Not Stop Pollutants

Small Colloidal Particles Carry Pollutants
Through Environmental Barrier



Turbidity curtain----->

Genito Road Causeway

Dec. 2003

Repeating Past Failures



McClean Lake, Saskatchewan, Canada
(Areva NC)

Too many tailings

Pond fills with rain, spills over

Plastic ground cover leaks

No backup for dam failure

Poor Site Planning



- Flooding at mine site
- Federal laws exempt mine operators from responsibility during floods

**Possible
Uranium
Mining Site
in Virginia**



Weak Federal Regulations

Federal laws exempt mine operators from responsibility during adverse weather

- Proposed design repeats past tailing-storage failures
 - Site location is:
 - near high population areas
 - subject to more
 - tornadoes, hurricanes
 - flooding, high rains
- than sites in western U.S.



Tornadoes in area
of proposed uranium mining

Summary

- LGA protects biodiversity of all Creation
- Use proper engineering standards (LOAEL)
- Some government regulations weak – not enforced by measurements or are to LOAEL standards; ALARA (as low as reasonably achieved) embodied in some state statutes is invitation to pollute.

Summary continued

- Most accidents can be prevented by using industrial design philosophies from 1980's
 - Don't repeat past mistakes
 - Use equipment and site designs that protect Creation when man-made equipment fails
 - Use preventative maintenance
 - Beware of laws not being enforced by measurements
 - If run equipment to failure, plan for failure
 - Test all safety devices on routine basis