





**Turbine Component Services** 

**Peabody** 

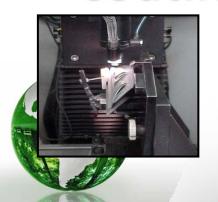
**Presented by Steve Mahoney** 



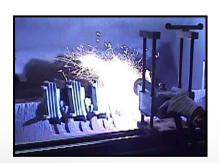


#### **Peabody Expertise**

A Service Source specializing in hot section turbine components with emphasis on Aftermarket Repair & Overhaul supplemented by OEM brazing & coating









#### **Agenda for this Presentation**

- Provide a tool as an example of Aspect Analyses
- How significant aspects become objectives and targets
- A good Internal Audit and Management Review lead to an EMS that is implemented and maintained.



#### First Steps

Under General Requirements:

We defined the <u>scope</u> of our environmental management system and set clear boundaries for our system

- TCS is an FAA certificated repair station with license to work on hot section components of a variety of gas turbine engines. It also provides metallurgical services to aircraft turbine manufacturers. Its manufacturing activities are performed in two buildings:
- #1 Fifth Street, Peabody, MA 01961 approximately 174,024 square feet in size
- #8 Fifth Street, Peabody, MA 01961 approximately 127,154 square feet in size
- An additional property that TCS owns is located at #6 Fifth Street,
   MA 01961 approximately 52,391 square feet.



# We endorsed the Company EHS Policy rather than creating a separate site policy

#### **Policy**

Goodrich Corporation is committed to achieving excellence in environment, health and safety performance and to providing our customers with products and services designed, produced and maintained to meet or exceed their expectations and Goodrich specifications. These products and services will be provided while meeting or exceeding all applicable regulatory requirements and other requirements to which the company subscribes and in a manner that prevents pollution. We will utilize the policy deployment process to meet quality and EHS requirements while pursuing continuous improvement and reflecting our vision of *Creating Value Through Excellence in People, Quality and Innovation.* (GRMA-001-POL-00, Section 5.3)

Marketto-Leven

Michael Stewart

## We listed all of the facility's Legal Requirements

Permit Description	Governing Board	Identification #, Regulation #	Reg. D at e	Exp. D a t e	Cost	Aspect	Impact
Air Registration, Conventional Source-Minor, 1 Fifth St.	MA Dept. of Environmental Protection P.0. Box 3584 Boston, MA 02241-3584	Account # 1197659 310 CMR 7.02, 7.08, etc.	8/28/	8/07. (See ema	nail in Com	Mark Wert, Project Ma nmunications Log) Data gineers on behalf of TC	a submitted by Dan
Air Registration, Conventional Source-Minor, 8 Fifth St.	MA Dept. of Environmental Protection P.0. Box 3584 Boston, MA 02241-3584	Account # 1191318 310 CMR 7.02, 7.08, etc.	8/15/10	8/15/13	\$325	VOC's Solid particulate NOx CO <sub>2</sub>	Pollution from heating fuel, powders, volatile organics
Flammable Materials Permit (\$50.00)	MA Department of Public Safety-Fire Prevention 1010 Commonwealth Ave., Boston	Class A: 120,00 g.f. gaseous hydrogen	4/30/10	4/30/11	\$50	Hydrogen gas	Potential Explosive
Flammable Materials License	Peabody Fire Department	Permit #: 012423	4/30/10	4/30/11	\$10	Flammable Materials	Potential Fire
Hazardous Waste Generator, Building I	US EPA	(Walbar, Inc.) ID # MAD001027838 310 CMR 30	1/10	1/11	\$525	Nickel Plating Oil changes	Waste management Potential spill
Hazardous Waste Generator, Building II	US EPA	(Walbar Metals) ID # MAD053464525 310 CMR 30	1/10	1/11	\$342 0	Nitric acid O Acetic acid Phosphoric acid Hydrochloric acid	Waste management Potential spill
NPDES Storm Water Permit, Building I	US EPA, Office of the NPDES	MAR05B112 MAR05CT05 (tracking)	1/5/09	1/5/13	NA	Metals, powders, acids, oils	Potential release
NPDES Storm Water Permit, Building II	US EPA, Office of the NPDES	MAR05B113 MAR05CT04 (tracking)	1/5/09	1/5/13	NA	Metals, powders, acids, oils, bases	Potential release
Sewer Connection Permit, Building I	MA Dept. of Environmental Protection P.0. Box 3584 Boston, MA 02241-3584	Customer # 1005615218000	1/07			y per Jim Belsky at the l MADEP as of July 30, 2	

Permit Description	Governing Board	Identification #, Regulation #	Reg. Date	Exp. Date	Cost	Aspect	Impact
Sewer Connection	MA Dept. of	No. 126513 / IWW No.	7/09/07	No longe	or necessar	v ner Iim Relsky a	the Bureau of Waste
Permit, Building II	Environmental Protection, 10 Commerce Way Woburn, MA 01801 (617) 932-7600	N97CI011B BWP IW 34	1103101			P as of July 30, 20	
W.W.T.S. Plant Code (for operator license renewal only)	MA Dept. of Environmental Protection Board of Certification of WWTPO	1371-Chuck Edwards, Grade III, 12781-Steve Mahoney Grade IV 15258-Sean Lyons, Grade III	12/09	12/11	\$80 each	Industrial Wastewater	Untreated wastewater discharge to POTW
W.W.T.S. Staffing Plan	MA Dept of Environmental Protection Northeast Region	Staffing Plan submitted to MADEP under 314 CMR 12.00	6/16/09	6/16/11	N/A	Industrial Wastewater	Untreated wastewater discharge to POTW
Waste Water Discharge Permit, Metal Finishing Point Source Category, Subpart A-Metal Finishing Subcategory	South Essex Sewerage District 50 Fort Ave., P.O. Box 989, Salem, MA 01970 (978) 744-4550	40026 Coating Bldg. 41045 Repair Bldg.	12/18/1 0 12/17/0 9	12/18/1 2 12/17/1 1	N/A N/A	Acids, bases, metals	Potential Release
Toxic Use Reduction Fees "Form S"	DEP	ID # 131125	7/10	7/11	\$6825	Acids, bases, metals	Potential Release
Large Quantity Shipper Registration (Hazardous Materials)	Department of Transportation (DOT) PO Box 740188 Atlanta 30374-0188	Carriers USDOT #	June 1 <sup>st</sup> 2010	June 1st 2013		Hazardous materials	Potential Release
TUR Planner (Steve Mahoney)	MA-DEP-TURA	Planner ID# 227226	4/05/11	4/05/13	\$250		144 1

We defined our aspects and rated their significance using a tool that accounts for site vulnerability, activity analysis, inputs, and outputs.

### **Environmental Aspect Tool 007-WRK-02 Introduction and Instructions**

**Step 1 - Vulnerability Review** 

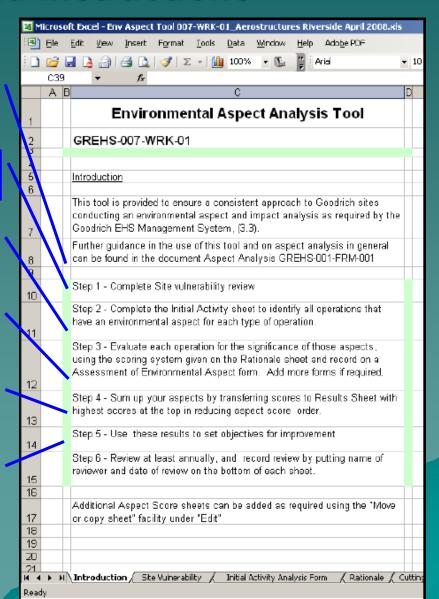
**Step 2 - Initial Activity Sheet** 

**Step 3 - Evaluate Each Operation** 

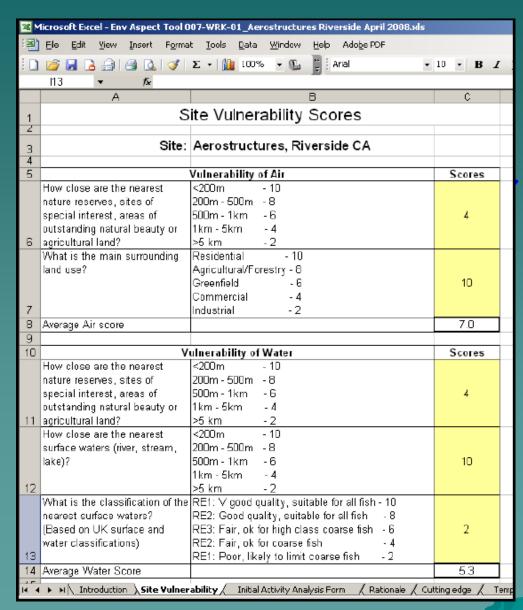
**Step 4 - Transfer Scores to Results Sheet** 

**Step 5 - Set Objectives for Improvement** 

Step 6 - Review (at least annually)



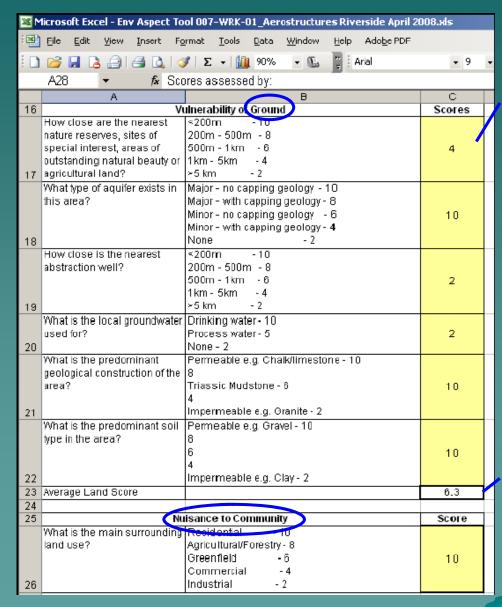
#### Section 1 – Site Vulnerability Review



Score Air and Water according to column B

Average Scores from the Site Vulnerability Review are linked to Aspect Assessment worksheets

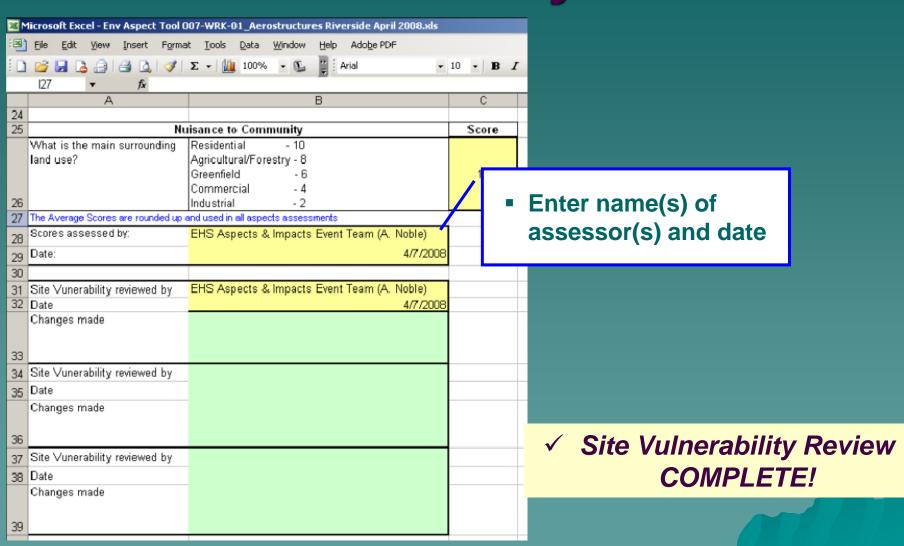
### Site Vulnerability Review



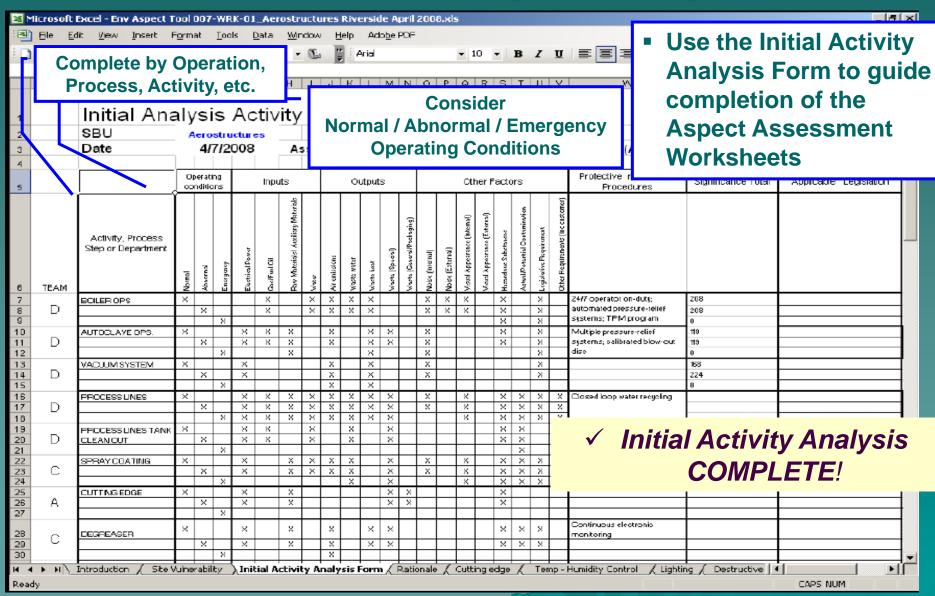
 Score Land and Nuisance to Community according to column B

= AVERAGE (C17:C23)

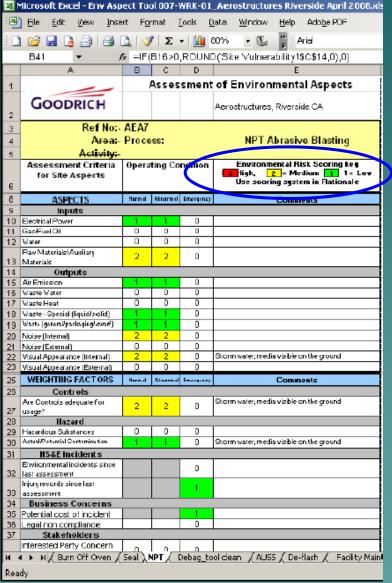
### Site Vulnerability Review



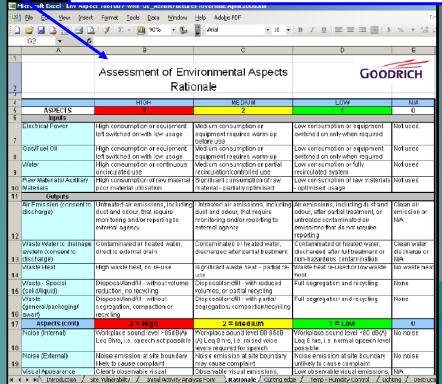
### Initial Activity Analysis

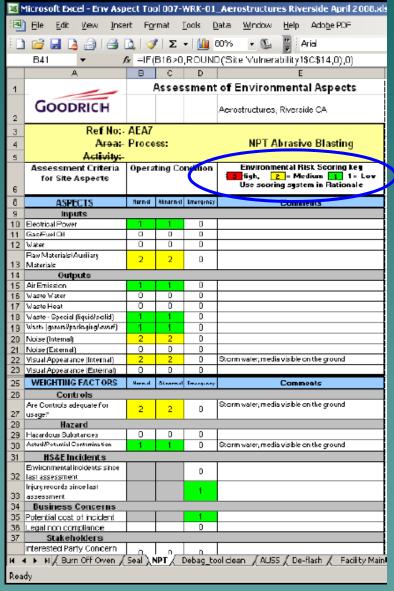


#### Aspect Assessment Worksheets

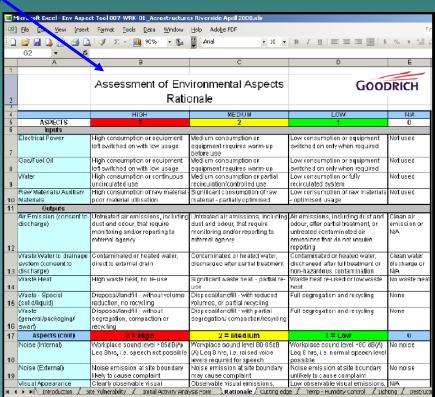


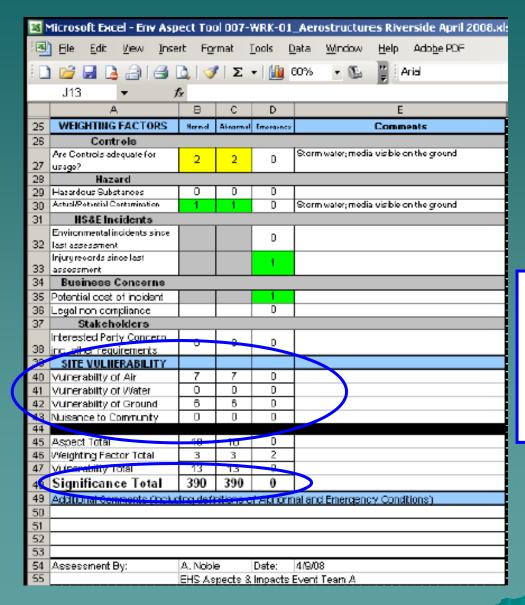
 Consistency in evaluation and scoring each process using the Rationale Sheet ensures that the most significant processes have the highest Significance Total scores





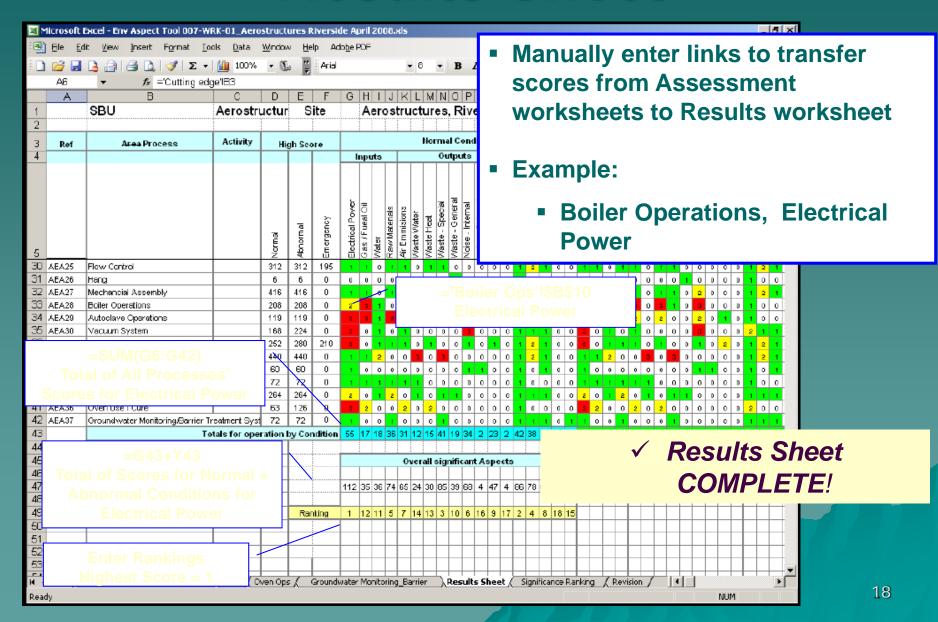
- When scoring Outputs, consider each potential aspect and impact to air, water, and land
- Example: NPT Abrasive Blasting uses aluminum oxide grit blast media
  - Air emissions
  - Stormwater impacts
  - Hazardous waste
  - Recycle

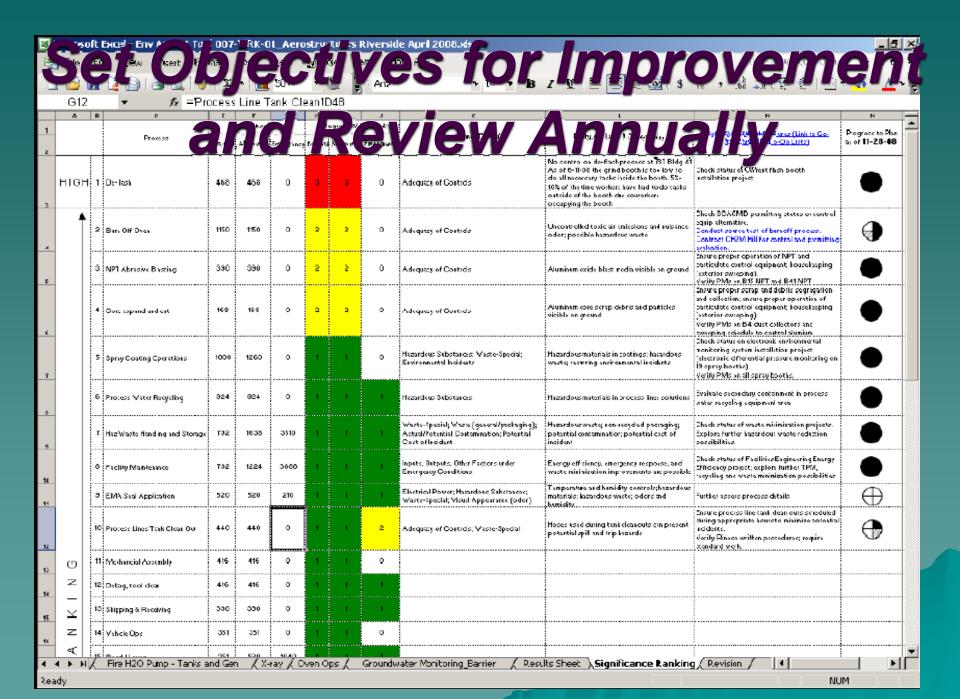




- Output scores are related to Site Vulnerability
- Scores for specific Output category come from the Site Vulnerability sheet

#### Results Sheet





Location	Activity, Product, Service	Aspect	Impact	Engineering Controls	Legal	Significance	Total
				Systems	Requirement	Ranking	
Strip and Recoat	Material Removal, Acid Stripping, Acid Storage	Acids, Bases	Air emission, potential spill	Secondary Containment, Controlled Inventory	310 CMR 7.00, 310 CMR 30, 49CFR 132	1	9450
Powder Pack / Unpack		Metals, powders	Potential Release	Extraction, Recycle	310 CMR 7.00, 40 CFR 122	2	8750
Heat Treat - Coating	Metal Coating	Chromium	Potential Release	Extraction, Recycle	40 CFR 433 subpart A, SESD SUR Rev. 11-03	3	8675
	Hydrogen Gas Use	Hydrogen use	Potential Explosive	Furnace Systems	Peabody FD		
	Natural Gas Use	Gas use	Air Emissions	Furnace Systems	310 CMR 7.00		
	Argon Gas Use			Furnace Systems	522 CMR 17		
	Coating	Electricity	indirect emissions				
FIC/CVD	Metal Coating	Hydrogen Chloride	Potential Release	Cabinets vented to Scrubber	6 CFR 27	4	8450
	Metal Cleaning	Hydrogen Fluoride	Potential Release	Cabinets vented to Scrubber	6 CFR 27		
Plating	Electrolytic Platinum Plating	Plating Solution, Solvents	Potential Release	Extraction to Scrubber	40 CFR 433 subpart A, SESD SUR Rev. 11-03	5	5025
Waste Water	Nickel and Chromium Removal, pH Adjustment	Metals, powders	Potential Release	Batch system	40 CFR 433 subpart A, SESD SUR Rev. 11-03	6	3168
Powder Mix	Mixing alloy powders for heat treat processes	Metals, powders	Potential Release	Extraction	310 CMR 7.00, 40 CFR 122	7	2000
	Powder Storage	Metals, powders	Potential Release	Dehumidifiers	310 CMR 7.00		

Location	Activity, Product, Service	Aspect	Impact	Engineering Controls	Legal	Significance
				Systems	Requirement	Ranking
Vane Segment Cell	EDM, grinding	Oils, Coolants	Potential Spill	Secondary Containment	40 CFR 112	8
	Benching	Metals	Potential Release	Extraction	310 CMR 7.00	
Vane Ring Cell	Welding	Metals	Air Emission	Extraction	310 CMR 7.00	12
	Grit Blasting	Grit Blast Media	Potential Release	Recycle Program		
Large Engine Cell	Degreasing, Cleaning	Solvents	Potential Release	Oil/Water Separators	40 CFR 433 subpart A, SESD SUR Rev. 11-03	14
Braze	Brazing, cutting, spot welding, nickel plating	Plating Solution	Potential Spill	Secondary Containment	49 CFR 172, 310 CMR 30	9
	Grit Blasting, pasting	Grit Blast, nickel	Potential Release			
FPI Repair	Fluorescent Penetrant Inspection	Penetrants	Potential Release		40 CFR 433 subpart A, SESD SUR Rev. 11-03	10
FPI Coating		Penetrants	Potential Release			15
Maintenance	Grind, Weld, Degreasing, Air Flow, Blasting	Oils, Oily Solids, Solvent	Potential Spill		40 CFR 112	11
	Universal Waste Handling	Wastes	Potential Release		310 CMR30.143, .1000 & .1038	
Heat Treat - Repair	Argon Gas Use			Furnace Systems	522 CMR 17	13
	Coating	electricity	indirect emissions			
Coating	Masking	Powder, Nickel	Potential Release			16
180 day storage area	Storage of Hazardous and non-hazardous wastes	Acid, Oils, Coolants	Potential Spill		310 CMR 30, 49 CFR 172	17
90 Day Storage Area	Storage of Hazardous and non-hazardous wastes	Acids, Oils, Bases	Potential Spill		310 CMR 30, 49 CFR 172	18
Shipping and Receiving	Shipping/receiving of product and raw materials.	Raw materials	Potential Release			19
X-Ray NDT	Non- Destructive Testing	Film	Potential Release	Lead Foil, Film Collection		20
					1///	

## Significant Aspects become Objectives and Targets

- Some significant aspects have already reached Best Available Control Technology.
- These aspects should still be listed to show that they were considered during management review

#### Successful Objectives and Targets

- Electricity Reduction
- Hazardous Chemical Inventory Reductions
- Pulse Plating of Nickel Compounds
- Natural Gas Reduction

## Electricity Reduction as an Objective with 5% target

- Our electricity consumption in 2007 was 5,975,200 Kilowatt hours.
- We installed variable frequency drive air compressors in our two main buildings.
- At the same production output our consumption dropped to 5,592,800 Kilowatt hours.
- Savings = 382,400 KWHr = \$45,900 at 0.12/KWHr

### Electricity Reduction as an Objective with 2% target

- Since 2008 we installed variable speed drives on several motors from 10 to 40 horsepower
- We also installed T8 28W lamps to replace 32W lamps
- The added reductions resulted in a savings of 349,200 KWHr
- ◆Total reduction from 2007 has been 731,600 KWHr or 12.2%

## Not So Successful Objectives and Targets

- Nitric Acid Reduction
- Solid Waste Reduction

#### Nitric Acid Reduction

- Filters were installed in all nitric acid tanks - acid longevity was unaffected
- Additives to increase acid longevity were used –Our customers would not grant approval to use them
- An acid recovery system using diffusion dialyses was purchased

% Comp

Reduce nitric acid use in stripping operations. Improvement Target

Do

(Major elements of Plan)

Achieve a 5% reduction from

Revise ESP 4.4.6-11 Strip &

Recoat Nitric Acid Filtration

Run the feed pump at a slower

Fill holding tank for nitric acid

input speed

#### Achieve a 5% reduction from 2009 total.

No.

**Objective** 

Plan

(Macro-Plan)

Reduce nitric acid

usage in stripping

1	operations. Implementation target date 5/7/10.	2009 usage.	•	e) H	reclaim spent material and not impact quality standards. Aqualogic Acid Recovery System.	Mahoney
2	Reduce nitric acid usage in stripping operations. Implementation target date 5/7/10.	Evaluate past annual consumption levels and compare to post filtration implementation levels.	•	8	Drawings developed and reviewed, materials purchased and received, installation completed.	Mahoney, Lyons, Ciarcia
3	Phase in utilization of Nitric filtration system.	Design and install machanical system between filter and chemical tanks.	•	8 8	Drawings developed and reviewed, materials purchased and received, installation completed.	Mahoney, Maintenance Team
4	Phase in utilization of Nitric filtration system.	Test run the system. Schedule for WE 4/4/10.	•	6	System will be connected to waste stream and output will be evaluated on scrap material. First drums of test material are available as of 4/16/10.	Mahoney, Maintenance Team, Ciarcia, Chemical Operators, Engineering
					ESP currently covers previously utilized filters,	

Check

**♦**△

**♦**△

**♦**△

Phase in utilization

of Nitric filtration

Increase specific

gravity of the

reclaimed acid.

Add up to 15% to

new batches

C6 tanks. Target date is 7/16/2010. As of 12/13/2010 1.4 spec. gravity acid has yet to be achieved after numerous attempts. Holding tank and feed lines have leaks that must be repaired. A cone bottom tank will be purchased by 11/12/2010. Since the correct spec. gravity acid is unattainable, the cone bottomed tank will not be needed.

revision will preceed use of the reclaimed

3 drums of reclaim were produced with increasing specific gravity. When 1.4 or above

is now obsolete.

material for production. As of 12/13/2010 filters

are no longer utilized. Procedure ESP 4.4.6-11

is achieved, the reclaim will be recycled into the

Act

(Details of 3-month rolling plan)

Source a nitric condusive filtration unit that will

**Assigned** 

Mahoney, Ciarcia

Mahoney, Ciarcia

#### Nitric Acid Recovery

- Diffusion Dialyses works
- However, the acid is reduced in strength from 70% to about 45%
- Nitric acid forms an azeotrope with water.
- It boils with water at 82 to 122 degrees C depending on the percentage of nitric acid in solution

#### Nitric Acid Recovery

 We could not boil the solution to increase concentration

We learned that reducing our acid bath temperature reduces our nitric acid loss to the scrubbing system.

#### **Examples of Operational Controls**

				,			
•	ESP 4.4.6						
•	Operational Control 1/5/2010	Procedure describ	oing the operation	nal created to ma	nage EC Peabody's	identified significant environmenta	aspects.
•	ESP 4.4.6-01						
•	Hazardous and Non-Hazardo Peabody. 9/15/2009 ESP 4.4.6-02	ous Waste Manage	ment Program	Procedure to de	fine the manageme	ent of hazardous and non-hazardou	s waste at EC
•	Recycle and Reuse Program	Outlines the Res	valo and Dauca Dr	ogram as implom	ontod	1/11/2010	
<b>*</b>	ESP 4.4.6-02 Appendix 1	Outilities trie Recy	cie aliu Reuse Pi	ografii as iiripieti	eriteu.	1/11/2010	
* *	Recycle Vendor List ESP 4.4.6-03	List of vendors us	sed in the recycle	and reuse opera	tional control.	1/5/2010	
• •	Universal Waste Program ESP 4.4.6-04	This procedure de	efines the method	ds for handling ur	niversal waste gene	rated at ECD Peabody.	4/23/2010
<b>*</b>	Waste Handling	Describes how to	handle waste pro	oduced at TCS.	1/23/2006		
<b>*</b>	ESP 4.4.6-05						
<b>*</b>	Recycle Handling ESP 4.4.6-06	Defines procedure	es for handling re	ecyclable material	S.	10/28/2010	
<b>*</b>	FIC/CVD Scrubber Waste ha	andling Doccribos h	now an aparatar t	ranefore the cerui	hhar wasta ta wast	o water for proceeding	1/11/2010
<b>~</b>	ESP 4.4.6-07	inding Describes i	iow an operator i	iansiers the scru	obel waste to wast	e water for processing	1/11/2010
÷	Extractor Waste Handling 5/27/2010	Describes the pro	cess to be used	when handling wa	aste from extractor	units used by Engine Components	Peabody.
•	ESP 4.4.6-08						
•	HCL and HF Cylinder Handli FIC/CVD processes.	ng 7/20/2010	This procedure i	s for the proper h	andling of cylinders	s that contain HCl and HF gases use	ed in the
<b>*</b>	ESP 4.4.6-09						
<b>→</b>	Strip & Recoat Chemical Ha and Recoat Cell.	ndling 6/18/2008	Procedure to pro	perly store and h	andle hazardous m	naterials used in the Chemical Room	of the Strip
<b>*</b>	ESP 4.4.6-09 Appendix 1	An an an an an an a	Chain and Dasse	Call muidea ta m	anauli, banalla bana	(/10/2000	
<b>♦</b>	Strip and Recoat Chemical I ESP 4.4.6-10	wanagement	Strip and Recoa	t Cell guides to pr	openy nandle naza	rdous materials. 6/18/2008	
<b>*</b>	Acid Fume Scrubber Mainter	nance	Procedure to ens	sure proper opera	tion of the acid fun	ne scrubber located on the roof of 8	Fifth Street.
	6/1/2010 ESP 4.4.6-11						
•	Strip & Recoat Nitric Acid Fi	ltration	Procedure descr	ihing how to oper	ate nitric acid filtra	tion equipment installed in the Strip	and Recoat
	Cell. 6/18/2008	in anon	Troccadic acsor	ising now to open		tion equipment instance in the out-	dia Recour
<b>*</b>	ESP 4.4.6-12 Chemical Management Prog	ram	This procedure	outlines the requir	compate for orderin	g and receiving chemical at TCS.	7/20/2010
<b>♦</b>	ESP 4.4.6-12 Appendix 1	T CITT	mis procedure (	diffices the requir	ements for orderin	g and receiving chemical at 103.	772072010
<b>*</b>	Approved Chemicals List	This is the approx	ved chemicals list	for Engine Comp	onents - Peabody	1/7/2010	
<b>*</b>	ESP 4.4.6-13	ppis		3,0,0			
<b>&gt;</b>	Contractor Management	Operational contr	ol defining the m	anagement of co	ntractors on site at	Engine Components Peabody.	7/24/2009

### Operational Control

- The operational control procedures are the heart of any EMS
- They define the system that a company is using to control its operations
- The employees in the company are directly responsible for these operations. Given the proper instructions, the employees do a great job following and improving the environmental procedures

#### **Management Review**

- A good internal audit leads to a good Management Review
- A good Management Review proves that your system is implemented and maintained.
- So,.....
- Who's going to answer the 199 questions to complete your internal audit?