

P-8A Poseidon

HAZMAT Identification and Chemical Mapping Strategy

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Poseidon



Report Documentation Page

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P-8A Poseidon Program Overview

- The P-8A Poseidon is a commercial aircraft derivative based on the latest generation Boeing 737 platform as a replacement for the P-3C.
- Mission systems are similar to those employed in PMA-290 legacy aircraft.
- The P-3C aircraft currently provide the US Navy with both tactical and strategic blue water and littoral undersea warfare capabilities in addition to armed intelligence, surveillance and reconnaissance functions.
- The P-8A is an Acquisition Category (ACAT) ID weapon system program that entered the System Development and Demonstration (SDD) phase in May 2004.





Incorporating ESOH into System Design

- Multi-mission Maritime Aircraft (MMA) Environment, Safety, & Occupational Health (ESOH) Design Guide
 - To reduce cost of ESOH compliance, MMA ESOH Design Guide was developed and published for the Component Advanced Development (CAD) phase and updated for the System Design and Demonstration (SDD) phase
 - Identify life cycle Design for the Environment and Safety (DFES) strategies
 - Incorporate DFES concept into the systems engineering process
 - Program's strategy for compliance with ESOH requirements
 - Integrating elements of contractor ESOH programs into the Government's ESOH programs
 - Provide guidance for preparation of ESOH related deliverables



Incorporating ESOH into System Design (Cont'd)

- Performance Based Specification (PBS)
 - ESOH regulatory requirement
 - The P-8A System shall be capable of being manufactured, tested, operated, maintained, repaired, and disposed of in accordance with all applicable ESOH regulatory requirements.
 - Hazardous Materials (HAZMAT) Management requirement
 - The P-8A System design shall incorporate design features to eliminate or reduce hazardous waste generation and life cycle requirements for hazardous materials.



Incorporating ESOH into System Design (Cont'd)

- Programmatic Hazardous Materials Management Program (HMMP) and Pollution Prevention (P2) Plan was developed and published prior to SDD phase
 - To protect human health and environment by eliminating or reducing HAZMAT usage, emissions and wastestreams
 - Approaches from a life-cycle perspective to minimize risk and cost
 - To ensure continuous compliance with Federal, State and local regulations
 - To ensure that adequate controls and management practices are in place for worker safety and environmental protection, when HAZMAT must be used



Incorporating ESOH into System Design (Cont'd)

- Deliverable requirements for SDD contract
 - Contractor HMMP/P2 Plan
 - Prime contractor will develop HMMP Plan and Reports
 - Focus on developing and delivering data needed by Govt
 - Report shall include the information required by National Aerospace Standard (NAS) 411
 - NAS 411
 - The HMMP Plan is the basis of understanding between the contractor and procuring agency with respect to execution of the HMMP
 - A HAZMAT is any material that due to its chemical, physical, or biological nature causes safety, public health, or environmental concerns



Incorporating ESOH into System Design (Cont'd)

- Deliverable requirements for SDD contract (Cont'd)
 - HMMP Report
 - Identify HAZMAT delivered on the P-8A aircraft
 - Identify HAZMAT required to operate and maintain the P-8A System.
 - A material is hazardous if it exhibits hazardous properties during any part of the P-8A life cycle
 - Data obtained will be used to comply with requirements of environmentally related laws and to plan for disposal
 - Report shall include the information required by NAS 411



Hazardous Material Identification for P-8A

- Issue: Boeing is responsible for identifying HAZMAT delivered to the Navy on the P-8A aircraft
 - HAZMAT Identification for Basic 737 Design
 - Lack of Data: no existing HAZMAT list
 - Cost Prohibitive through traditional Design Review
 - HAZMAT Identification P-8A Unique Design
- Solution:
 - Create a P-8A Poseidon “Chemical Map”
 - Tap into Boeing’s Automated Material Safety Data Sheet (MSDS) System
 - Link Data Elements with Design Data
 - Facilitate HAZMAT Identification



P-8A HMMP Data Needs

- Boeing currently fulfills contract HAZMAT obligations by delivering three sets of data to the Government:
 - MSDSs associated with the aircraft structure and mission systems, contained in Boeing's electronic MSDS System files
 - A Microsoft Access Database that remains under construction
 - Provide a common source of connection and structured queries
 - Spreadsheets providing material breakdowns of Boeing 737 commercial airplane parts, and mission system materials identified through Subcontractor Data Requirement List (SDRLs)





Existing Boeing Data Sources for Chemical Mapping Strategy

- Boeing sources of hazardous materials data;
 - The Boeing MSDS System; MSDS data and images
 - HAZMAT: Material Distribution and Tracking System for BCA
 - Enviro Tags database: a database for tracking regulatory issues for chemicals and providing this information in a common database
- The government sources for listing chemicals that are subject to regulations
 - The EPA “Lists of Lists”: Identifies Superfund Amendments and Reauthorization Act (SARA) 311, 312, and 313 chemicals and reporting quantities
 - The EPA Class I and Class II ODS: Identifies Ozone Depleting Substances
 - The P-8A Restricted and Prohibited Materials List: Identifies materials of concern under the P-8A contract



Data Identification and Analysis Procedure

Using the ListofLists.mdb and its SQL queries

- Review Boeing manufacturing drawings and processes
 - Reference Engineering Data Automated Retrieval System (REDARS) with drawing search capabilities
 - Identify the materials specifications used in the manufacture and assembly of parts
- Identify the materials that are used to satisfy the specification in the Product Standards Data System (PSDS)
- Query the HAZMAT database to identify the specific material being used in the production
- Identify any regulatory issues that the material might have
- Suppliers have SDRs that mandate compiling questionnaires and spreadsheets that provide Hazmat reporting by suppliers





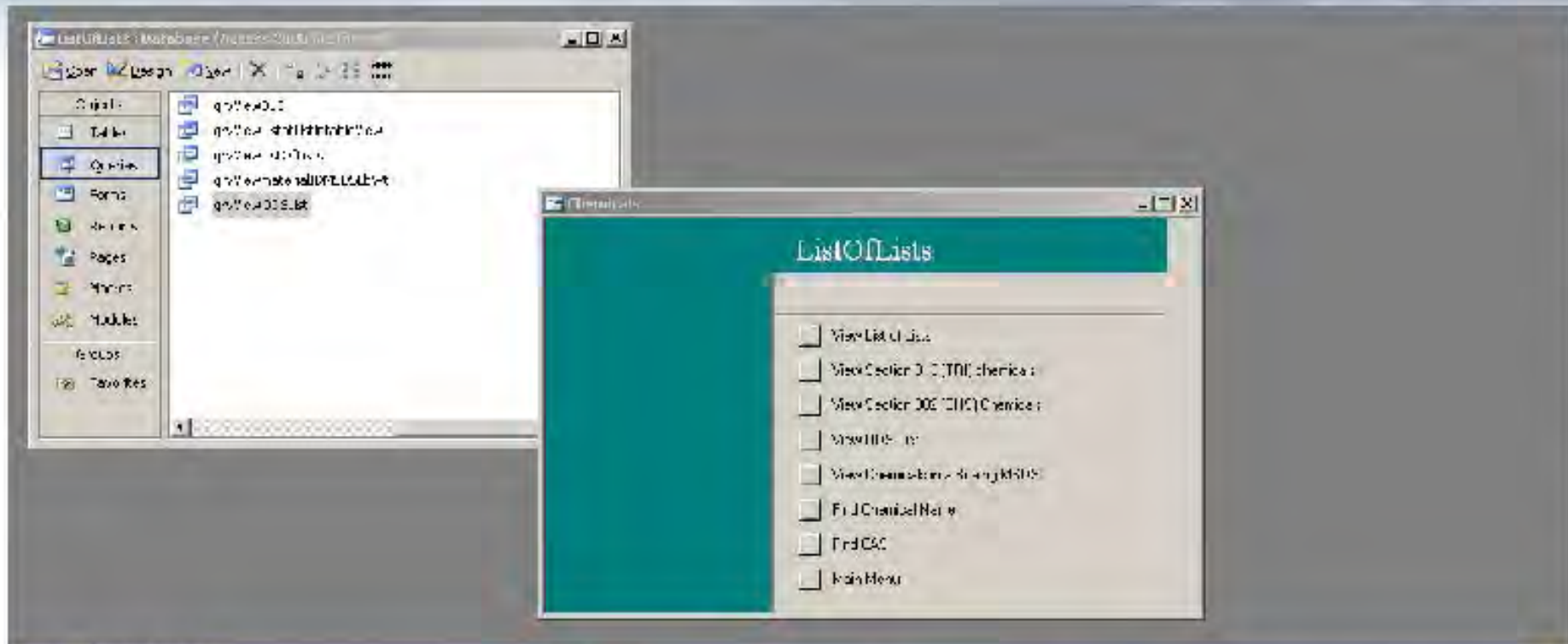
ListofLists.mdb Uses

- Uses and Capabilities of ListofLists.mdb
 - Find a production material by entering the specification number in a query.
 - View chemical lists such as Toxic Release Inventory (TRI), Ozone Depleting Substances (ODS), or Superfund Amendments and Reauthorization Act 311/312.
 - View the chemicals, CAS numbers, and percent that are in a material as listed on the MSDS sheet.
 - Find regulatory issues of any chemicals that are used in production materials.
 - Find a list of materials by entering a specification, including a wildcard search.





ListofLists.mdb



MSDS	is a/ site	CAS	Chemical
83434	6/18/1967	0001317508	CALCIUM CARBONATE
03434	0/10/1909	0001000064	CARBON BLACK
83434	6/18/1967	0001463871	MAGNESIUM OXIDE
03434	0/10/1909	0002906250	MET-PLATE/UBENEDICTIENCL PMN/W/QUEST DIS/EXTR/INDI
83434	6/18/1967	0002947082	P-ENOL POLYMER/W/FER/ALDE-HYDE
83434	6/18/1967	0001061448	STIBIC
03434	0/10/1909	0001700029	TERRIENYL HYDROGENATED



Web Based Boeing MSDS System

- The Boeing MSDS System is a web based database that both stores and retrieves MSDS data and images specifically for complying with the Hazards Communication (HAZCOM) Rule. It also is the repository of a set of data tables that lists all data that the manufacturer supplies on the MSDS sheet.
- Provides specific materials indentified by the name of the material, the manufacturer, and any specification listed for the material.
- P-8A uses the List of Lists Database to view the MSDS information and chemicals in a Boeing System MSDS.



Web Based Boeing MSDS System

HAZMAT Reporting System Page 1 of 6
MSDS 083434 REV 06/18/1997
Image Data From SunHealth

83434

Page: 1 MATERIAL SAFETY DATA SHEET Printed: 11/01/99
Supersedes: 12/03/95
Revised: 06/18/97

SECTION I - PRODUCT IDENTIFICATION

Manufacturer: JMC-CRYSTO INTERNATIONAL, INC. Information Phone: (318) 248-3089
A PPG INDUSTRIES COMPANY Emergency Phone: (504) 258-5635
2431 HAS FERRARO ROAD CHEMTRAC Phone: (504) 424-9300
BAYLUM, LA 70609

Product Class: POLYMERICS RESINER POLYMER
Trade Name: **PR-1436-2 Sol**
EPA Code: 14160190 - BASE COMPONENT

UN #: 311261
Proper Shipping Name: Paint
Reportable Quantity: See Section VII

Trade Name: PR-1436

SECTION II - INGREDIENTS		Weight %	Exposure Limits		FI
Hazardous Ingredients	CAS #		ACGIH/TWA	OSHA/PEL	or ID
PERFLUORINATED POLYETHER	008470-78-2	< 5	Undetermined		3/2P
EPDM RUBBER	025036-25-1	< 5	Undetermined		3/2P
*ALUMINUM +	07429-90-9	< 5	10 mg/NO 10 mg/NO	10 mg/NO 10 mg/NO	3/2P
HYDROXYMETHYL TERPENEYL	05758-12-7	< 5	0.5 ppm	0.5 ppm	
CARBON BLACK	01333-65-4	< 1	3.5 mg/NO	3.5 mg/NO	3/2P
SILICA @	07631-65-9	< 5	10 mg/NO	15 mg/NO	3/2P
TITANIUM DIOXIDE @	013453-67-1	< 5	10 mg/NO	10 mg/NO	3/2P
CALCIUM CARBONATE @ LIMESTONE	01337-65-2	5	10.0 mg/NO	15.0 mg/NO	3/2P
*MANGANESE CHLORIDE	013453-61-5	< 5	0.15 mg/NO 0.1 mg/NO	0.1 mg/NO 0.1 mg/NO	3/2P
*COALDIE	00900-81-3	20	50 ppm 50 ppm	100 ppm 100 ppm	23

VENDOR 006392
MSDS# 83434
T.R.





Chemical Mapping with REDARS

Hazmat can also be tracked to a specific location with material quantities identified. The specific steps in this process are as follows:

- Identify the Maintenance Zone in REDARS
 - REDARS Drawing Search
 - Identifies the specifications and materials used on the part
 - Drawing search defined by Maintenance Zones and related Collector Drawings,
- Identify the drawing and the referenced part numbers and specifications, using the Boeing MSDS System (and QPL and PSDS), and tables specifically prepared for the P-8A, identify each CAS ID and material quantities associated with a part number.



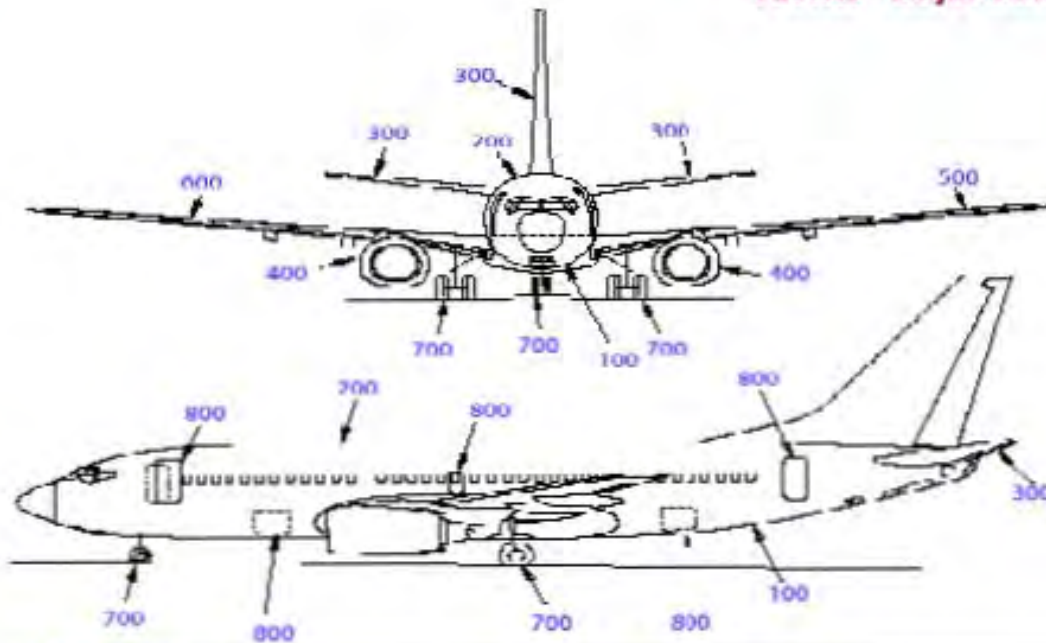


REDARS

Maintenance Zone Listings

Maintenance Zones

737NG - Major Zones



- Major Zone 100 - Lower Half of Fuselage
- Major Zone 200 - Upper Half of Fuselage
- Major Zone 300 - Body Section 48 and Empennage
- Major Zone 400 - Power Plant
- Major Zone 500 - Wing, Left
- Major Zone 600 - Wing, Right
- Major Zone 700 - Landing Gear & LG Doors
- Major Zone 800 - Doors - Entry, Service and Cargo

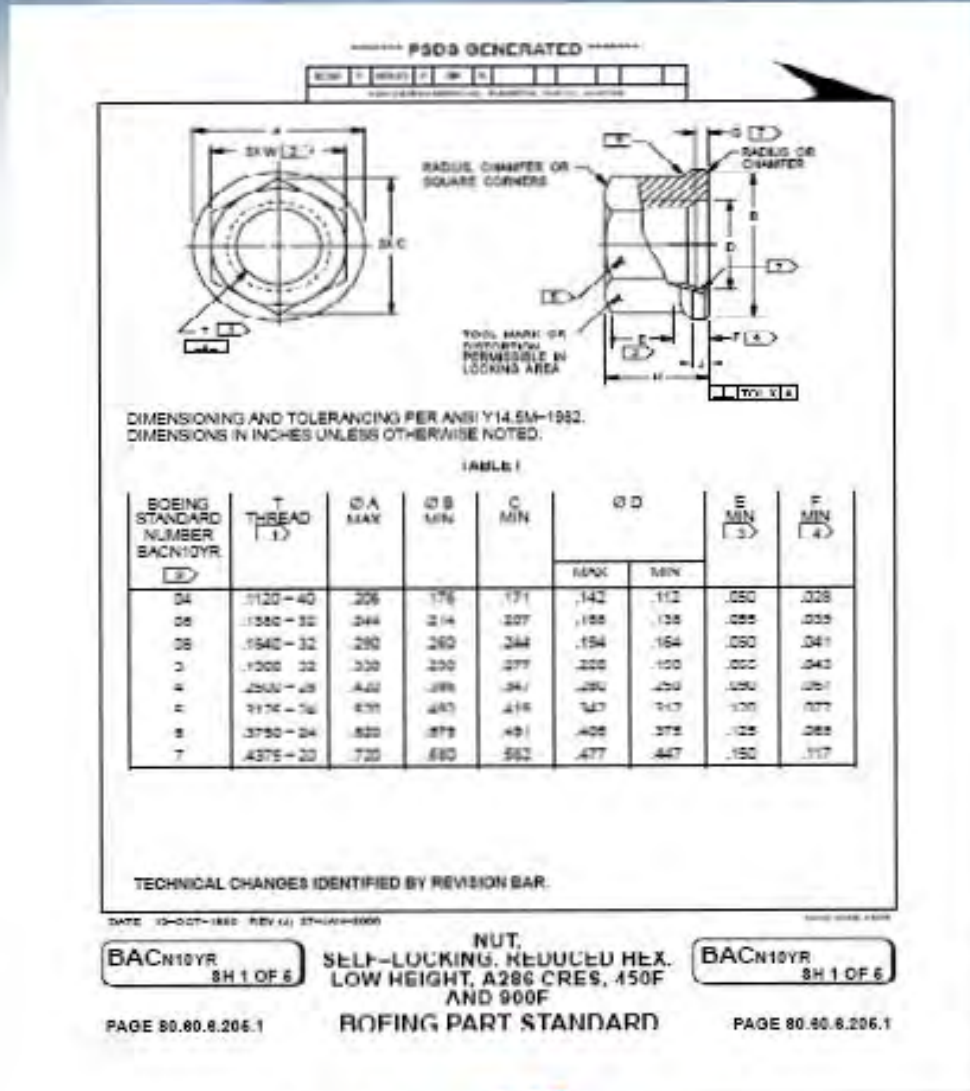
(Send zone # to search form)

Zone Number Maintenance Zone Description for: 737 NG

Select	100	Lower Half of Fuselage
Select	110	Subzone - Body Station 130 to Station 396
Select	111	Radarome
Select	112	Area Forward of Nose, Including



Part Drawing with BAC Notations





Materials Specifications Notes for BACN10YR

***** PDS GENERATED *****

PROCURMENT SPECIFICATION

SPQ-N-TL, EXCEPT AS NOTED, CLASS 13ST24 OR 13ST05.

MATERIAL

A286 UNLESS PER AWS 1543, AWS 5/21, AWS 5/22 OR AWS 5/27.

FINISH

SILVER PLATE PER AMS 5415 - 100% MINIMUM THICKNESS ON SURFACES WHICH CAN BE TOUCHED WITH A .75 BALL. THREADS SHALL SHOW COMPLETE COVERAGE, BUT THICKNESS REQUIREMENT IS WAIVED.

CADMIUM PLATE PER QQ-P-410, TYPE OPTIONAL, CLASS 2.

PASSIVATE PER QQ-P-35, TYPE II OR TYPE VIII OR AMS-QQ-P-35, TYPE II OR TYPE VIII.

LUBRICATION

CADMIUM PLATED AND PASSIVATED PARTS - SOLID FILM LUBRICANT PER MIL-L-46113, TYPE I, (INACTIVE FOR DESIGN AND PROCUREMENT, SEE MIL-L-46113 SUP) OR ASST2, TYPE I. (SUBSTITUTING THE LUBRICATION REQUIREMENTS OF ASST-1 AND HYDRAULIC FLUID RESISTANCE REQUIREMENTS OF SWS-E, ASST2 SHALL BE IN ACCORDANCE WITH THE CR. IN ASST2 SUP.

SILVER PLATED PARTS - NONE.

MARKING

MANUFACTURER'S IDENTIFICATION PER MIL-HDBK-101 OR REGISTERED, WITH THE U.S. PATENT AND TRADEMARK OFFICE (PTO) OF THE U.S. DEPARTMENT OF COMMERCE PLUS "7" (FOR SILVER PLATED AND PASSIVATED PARTS) OR "00" (FOR CADMIUM PLATED PARTS) RAISED OR DEPRESSED, D10 MAXIMUM. MANUFACTURER'S PART NUMBER OR SIZE MARKING OPTIONAL. NO IDENTIFICATION IS REQUIRED ON .1542 SIZE AND SMALLER.

CADMIUM PLATED (0000 "00") SHALL BE IDENTIFIED WITH BLUE PANT IN THE FORM OF A DOT OR SPRAY AFTER LUBRICATING. OVERSPRAY ACCEPTABLE ON TOP THREADS AND BASE. 3

PASSIVATED (0000 "00") PARTS WILL BE MARKED WITH A DOT OR SPRAY OF MIL-L-23177 BRNRY BRIMER (VI) (LOW TO VI) (LOW GREEN) OR) OVERSPRAY ACCEPTABLE ON TOP THREADS AND BASE.

DATE 13-OCT-98 REV (1) 2-JUN-2000 (UNCLASSIFIED)

BACN10YR SH 1 **NUT, SELF-LOCKING, REDUCED HEX, LOW HEIGHT, A286 CRES, 433F AND 900F** **BACN10YR SH 1**

PAGE 80.80.1.205.1 **BOEING PART STANDARD** PAGE 80.80.8.205.8



Product Standards Data System (PSDS)

- Using the specification callout in REDARS, PSDS can be entered via the web to see the specification's Qualified Products List (QPL) associated with the specification callout.
 - Material Callouts of Procurement Specification
 - Materials Specs for QPL Products



HAZMAT Database Development

- In Boeing's MSDS System, every MSDS that is received is analyzed for relevant chemical data, health hazards and environmental hazards. Chemical, IH and environmental Subject Matter Experts (SMEs) provide OSHA, EPA, TOSCA and related regulatory expertise.
 - Object Oriented Data tabulation into Oracle database
 - Provides access to regulatory data
 - Approach allows for MSDS revision history and regulatory updates
 - Provides structure & validated source
 - Eliminates manual analysis
 - Enterprise service availability



Chemical Mapping Strategy

- P-8A Chemical Mapping enables HAZMAT identification, quantity, chemical constituents, and locations on the Boeing P-8A.
- Benefits of Chemical Mapping
 - Near-Term :
 - Comply with DoDI 5000.02 requirement to document HAZMATs
 - Facilitate demilitarization and disposal planning.
 - Long-Term: Identify and locate materials of emerging regulatory interest over life of system.



Chemical Mapping Strategy

Sample of HAZMAT P-8A Database Data Query

ItemNu	MaintenanceZone	ItemLocation	ProductID	NoO	QtyPerUnit	Msmr	EHSIssue	CASNumber	MSDSNumber	MfgName
1	311	Hydraulics	0417432-BX	1	0.01	TBD	Irritant	7440439	V03720	Texfly Aerospace
2	311	Hydraulics	0417432-BX	1	0.01	TBD	Irritant	7440417	V6810	Texfly Aerospace
15	311	Hydraulics	0417432-BX	11	10	Gms	Irritant	7440020	V6640A1	Texfly Aerospace
16	311	Hydraulics	0417432-BX	11	7	Gms	Irritant	7440439	V10008-1	Texfly Aerospace
17	311	Hydraulics	0417432-BX	11	80	Gms	Irritant	7439921	TBD2	Texfly Aerospace
18	311	Hydraulics	0417432-BX	11	140	Gms	Irritant	7440315	TBD2	Texfly Aerospace
42	311	Hydraulics	0417432-BX	1	0.01		Irritant	149575	V19269	Texfly Aerospace
75	311	Hydraulics	0417432-BX	2	0.01		Irritant	7726956	VBCX85	Texfly Aerospace
76	311	Hydraulics	0417432-BX	2	0.01		Irritant	7439932	VBCX85	Texfly Aerospace
77	311	Hydraulics	0417432-BX	2	0.01		Irritant	7782505	VBCX85	Texfly Aerospace
105	311	Hydraulics	0417432-BX	1	0.01		Irritant	7439921	TBD3	Texfly Aerospace
106	311	Hydraulics	0417432-BX	1	0.01		Irritant	7440315	TBD3	Texfly Aerospace
168	311	Hydraulics	0417432-BX	1	30	Gms	Irritant	68410231	VK8137	Texfly Aerospace
169	311	Hydraulics	0417432-BX	1	4.8	Gms	Irritant	112243	VK8137	Texfly Aerospace
170	311	Hydraulics	0417432-BX	1	0.01		Irritant	78933	TBD1	Texfly Aerospace
171	311	Hydraulics	0417432-BX	1	0.01		Irritant	9003354	TBD1	Texfly Aerospace
172	311	Hydraulics	0417432-BX	1	0.01		Irritant	141786	TBD1	Texfly Aerospace
173	311	Hydraulics	0417432-BX	1	0.01		Irritant	Proprietary3	V135401	Texfly Aerospace
174	311	Hydraulics	0417432-BX	1	0.01		Irritant	112152	V135401	Texfly Aerospace
175	311	Hydraulics	0417432-BX	1	0.01		Irritant	7727437	V135401	Texfly Aerospace
176	311	Hydraulics	0417432-BX	1	0.01		Irritant	1333864	V135401	Texfly Aerospace
177	311	Hydraulics	0417432-BX	1	0.01		Irritant	14807966	V135401	Texfly Aerospace
178	311	Hydraulics	0417432-BX	1	0.01		Irritant	111762	V135207	Texfly Aerospace
179	311	Hydraulics	0417432-BX	1	0.01		Irritant	90722	V135207	Texfly Aerospace
180	311	Hydraulics	0417432-BX	1	19.8	Oz	Irritant	26125611	V43907	Texfly Aerospace
181	311	Hydraulics	0417432-BX	1	15.84	Oz	Irritant	7440440	V43907	Texfly Aerospace
182	311	Hydraulics	0417432-BX	1	11.22	Oz	Irritant	7440020	V43907	Texfly Aerospace
183	311	Hydraulics	0417432-BX	1	4.95	Oz	Irritant	7440508	V43907	Texfly Aerospace
184	311	Hydraulics	0417432-BX	1	8.4	Oz	Irritant	65997173	V43905	Texfly Aerospace
185	311	Hydraulics	0417432-BX	1	8.4	Oz	Irritant	12788793	V43905	Texfly Aerospace
186	311	Hydraulics	0417432-BX	1	7.2	Oz	Irritant	26125611	V43905	Texfly Aerospace
187	311	Hydraulics	0417432-BX	1	7.2	Oz	Irritant	9002884	V43905	Texfly Aerospace
188	311	Hydraulics	0417432-BX	1	2.04	Oz	Irritant	7440440	V43905	Texfly Aerospace
189	311	Hydraulics	0417432-BX	1	7.2	Oz	Irritant	32131172	V43905	Texfly Aerospace
190	311	Hydraulics	0417432-BX	1	7.2	Oz	Irritant	24968125	V43905	Texfly Aerospace
191	311	Hydraulics	0417432-BX	1	0.36	Oz	Irritant	13463677	V43905	Texfly Aerospace
192	311	Hydraulics	0417432-BX	1	8.4	Oz	Irritant	60676860	V43905	Texfly Aerospace

Record: 1 of 1102

Datasheet View

FLTR

NUM





Lessons Learned from SDD

- Ensure flow down of requirements from the Prime contractor to the subcontractors
- New Contractor Data Requirement Lists (CDRLs)
 - HMMP Database CDRL (to allow IT support)
 - HMMP Report CDRL (generated by database)
 - HMAUL Database CDRL (to allow IT support)
 - HMAUL Report CDRL (generated by database)
- New requirement for ESOH Technical Liaisons
 - Prime and major subcontractors with design authority
 - Respond to data calls and support EPAT