APPENDIX A

CHEMICALS PRODUCED AT HARRIMAN SITE

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Product	*Raw Materials*
2 aminopyridine (2AP)	pyridine sodium metal ammonia toluene heat transfer oil
2,6 diaminopyridine(DAP)	pyridine sodium metal ammonia heat transfer oil
2-amino-6-metrylpyridine (2A6MP)	alpha picoline sodium metal ammonia xylene
3-cyanopyridine from beta picoline (3-cyano)	beta picoline air ammonia catalyst
mandelamine (methenamine mandelate)	isopropanol mandelic acid methenamine Supercel
thyroglobolin (thyro)	hog thyroid glands sodium chloride sodium salicylate acetic acid (glacial) celite Solox - denatured ethyl alcohol
phenazopyridine hydrochloride (pyridium)	muriatic acid (HCl) aniline oil sodium nitrite DAP (2,6 diaminopyridine) sodium acetate

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oxtriphylline (CTH)	isopropanol theophylline choline bicarbonate methanol filter cell and norite A
phenylpropanolamine hydrochloride (PPA-HCl)	sodium nitrite methanol sulfuric acid anhydrous HCl propiophenone 50% caustic solution hydrogen platinum-palladium catalyst solka floc Norite isopropanol hydrochloric acid
pyridine-beta picoline (crude bases)	catalyst ammonia anhydrous (NH3) benzene monoethanolamine formaldehyde (56%) acetaldehyde
2-cyanopyridine	catalyst ammonia anhydrous (NH3) benzene alpha picoline
3-cyanopyridine	catalyst ammonia anhydrous (NH3) benzene beta picoline
niacin (nicotinic acid) from niacinamide hydrolysis batches (U.S.P. niacin)	niacinamide hydrolysis batch caustic solution (50%) norite (carbon) supercel sulfuric acid conco Supercel sulfuric acid conco

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Product		*Raw Materials*
acetaminophen (APAP)		para-nitro phenol palladium catalyst on carbon acetic anhydride hydrogen methanol sodium hydrosulfite carbon
cetyl pyridinium chloride (ceepryn)		pyridine toluene cetyl chloride
2-chloropyridine		2-amino pyridine water sodium nitrite concentrated HCl 50% sodium hydroxide
2-hydroxy pyridine		2-amino pyridine water sodium nitrite concentrated sulfuric acid calcium carbonate butanol
3-hydroxy pyridine		3-amino pyridine water sodium nitrite concentrated sulfuric acid
decamethylene glycol (DMG)	Step (1)	sebacic acid methyl amyl alcohol concentrated sulfuric acid 50% caustic
	Step (2)	methyl amyl sebecate (step 1) toluene sodium water
isonicotinyl hydrazide (isoniazid)	Step (1)	pyridine acetic anhydride iron powder water caustic

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isonicotinyl hydrazide (isoniazid)	Step (2)	4-ehtyl pyridine (step 1) nitric acid water air 50% NaOH
	Step (3)	isonicotinic acid (step 2) butanol p-toluene sulfon acid (catalyst)
	Step (4)	butyl isonicotinate (step 3) methanol hydrazine hydrate Darco treat filter
ketodase		deionized water glacial acetic acid thimersal liver, grade, frozen filtercel ammonium sulfate sodium acetate
mandelic acid		benzaldehyde sodium cyanide sulfur dioxide calcium hydroxide sodium hydroxide hydrochloric acid (37%) water ethylene dichloride carbon
2-methyl-5-ethyl pyridine		acetaldehyde ammonia gas ammonium fluoride (catalyst)
neohetramine (thonzylamine HCl)	Step (1)	2-amino pyrimidine (2AP) formic acid anisic aldehyde 50% caustic

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neohetramine (thonzylamine HCl)	Step (2)	secondary amine (p-methoxy benzyl amino pyrimidine) (step 1) dimethyl ethyl amino chloride xylene sodamide water
	Step (3)	thonyzlamine (step 2) isopropanol anhydrous HCl carbon
USP niacinamide (via niacin)	Step (1)	niacin butanol p-toluene sulfonic acid (p-TSA)
	Step (2)	butyl nicotinate (step 1) methanol ammonia carbon
USP niacinamide		3-cyano pyridine water sodium hydroxide carbon G-60
niacin (MEP method)		2-methyl-5-ethyl pyridine 70% nitric acid water 50% NaOH copper sulfate H2SO4 (sulfuric acid)
nardil (phenelzine sulfate)	Step (1)	phenyl ethyl alcohol thionyc chloride
	Step (2)	phenyl ethyl chloride (step 1) hydrazine hydrate
	Step (3)	phenyl ethyl hydrazine (step 2) isopropanol water sulfuric acid

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pralidoxime chloride (2-PAM)	Step (1)	2-cyanopyridine water concentrated hydrochloric acid catalyst-palladium hydrogen hydroxyl amine sulfate aqueous ammonia
	Step (2)	2-pyridine aldoxime (step 1) acetone dimethyl sulfate isopropanol
	Step (3)	2-pyridine methyl mothosulfate (ste concentrated HCl or gaseous HCl isoproponal
	Step (4)	crude 2-PAM (step 3) isopropanol water Darco KB, Darco G-60 treat filter norite USP and filter cel
Pacatal 10(1-methyl-3-piperdyl)phenothiazine - hydrochloride	Step (2A 2B, 2C)	ethyl nicotinate methyl bromide Solox (proprietary ethanol) platinum oxide 50% caustic sodium toluene methyl amyl alcohol carbon and filter cel hydrogen
	Step 3 & 4A)	step IIC toluene thionyl chloride tetralin 50% NaOH Supercel magnesium sulfate

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Product		*Raw Materials*
Pacatal 10(1-methyl-3-piperdyl) phenothiazine - hydrochloride	Step (4)	Step 3 phenothiazine lithium amide water salt acetic acid concentrated HCl Supercel isopropanol carbon black
parsidol (ethopropazine hydrochloride)	Step (1)	propylene oxide diethylamine methanol
	Step (2)	1-diethyl amino 2-propanol (step 1) toluene thionyl chloride city water 50% NaOH potassium carbonate
	Step (3)	toluene (step 2) sodamine phenothiazine sulfuric acid 50% caustic water potassium carbonate filter cel
	Step (4)	n(diethyl amino propyl phenolthiaz in toluene, dry (step 3) methanol hydrochloric gas Darco treat filter Supercel hydro quinone

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Product	*Raw Materials*
polyvinyl acetate (PVA)	Method (1) methyl ethyl ketone water sodium bicarbonate hydrogen peroxide vinyl acetate
	Method (2) water tricalcium phosphate acetaldehyde benzoyl peroxide vinyl acetate
	Method (3) water elvanol 51-05 and 50-42 Daxad 11 sodium bicarbonate sodium acetate methyl ethyl ketone hydrogen peroxide vinyl acetate
2-vinyl pyridine	2-methyl pyridine (2-picoline) 37% formaldehyde sodium hydroxide
niacinamide, USP	pyridine oleum (22%) sodium sulfide calcium carbonate sodium carbonate potassium carbonate sodium cyanide absorber oil sodium hydroxide water mercury Darco treat filter
aluminum hydroxide (AH)	aluminum sulfate solution sodium hydroxide solution (50%) water

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Product		*Raw Materials*
magnesium trisilicate (MTR)		sodium silicate solution magnesium sulfate solution water
picolinic acid		2-cyanopyridine 50% caustic solution sulfuric acid toluene isopropanol
niacin (nicotinic acid) from niacinamide ML		niacinamide mother liquor caustic solution (50%)(NaOH) norite (carbon) Supercel sulfuric acid conco
prazepam 7-chloro-1-(cyclopropylmethyl)-1 3-dihydro-5-phenyl-2H-1 4-benzodiazepin-2-one	Step (1)	methanol lactone (butyrolactone) anhydrous HCl gas toluene sodium bicarbonate caustic solution (50%)
	Step (2)	prazepam (step 1) sodium methylate sodium hydroxide solution (50%) toluene hexane hydrochloric acid
	Step (3)	prazepam (step 2) phosphorous trichloride (PCl3)
	Step (4)	toluene 2-amino-5-chlorobenzophenone triethylamine caustic solution methanol prazepam (step 3)
	Step (5)	vitride toluene caustic solution prazepam (step 4)

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Product		*Raw Materials*
prazepam	Step (6)	sodium methoxide (methaylate) Solox carbon PWA oxygen filtercel toluene methanol hydrochloric acid prazepam (step 5)
	Step (7)	acetic acid phthalic anhydride glycine
	Step (8)	toluene thionyl chloride caustic solution methanol prazepam (step 7)
	Step (9)	Darco G-60 filter toluene filtercel isopropanol methanol carbon PWA prazepam (step 6) prazepam (step 8)
	Step (10)	methanol hydrazine hydrate methanol chloride (M.C.) aqua ammonia (NH4OH) isopropanol (IPA) ethyl acetate prazepam (step 9)
oxolinic acid	Step (1A)	helioteopine 10% palladium on carbon

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Product		*Raw Materials*
oxolinic acid	Step (1B)	65% nitric acid water or nitric acid solution (M.L.) oxolinic acid (step 1A) isopropanol
	Step (2)	5% palladium on carbon isopropanol oxolinic acid (step 1B) hydrogen
	Step (3)	oxolinic acid (step 2) isopropanol diethylethoxy methylene malonate (EMME) city water
	Step (4)	Sunpar LW 120 oil oxolinic acid (step 3) toluene
	step (5)	dimethyl formanide sodium hydroxide, flake oxolinic acid (step 4) diethyl sulfate sodium hydroxide city water carbon black Supercel hydrochloric acid w.w. methanol dimethyl formamide