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To Pat Scofield	From W Tetley	
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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS SUBSTANCES REGULATION
BUREAU OF RADIATION
FIELD INSPECTION REPORT

INSPECTION : April 29, May 16, 1994

* amt of slag / yr generation
* DISPOSAL (rare earth)
§3.9

NAME: SKW Alloys
ADDRESS: 3801 Highland Avenue
Niagara Falls, NY 14305

COUNTY: Erie DEC REGION: 9 M2P2 FACILITY? no

RADIATION SAFETY OFFICER: Mr. Kenneth E. Kasprazak (Safety Manager)
TELEPHONE NUMBER: (716) 285-1252

Do not return
DYRAL

PART 380 PERMIT TYPE(S): N/A
PART 380 PERMIT NUMBER(S): N/A
PART 380 PERMIT EXP DATE:
Emission Point/Outfall #:
OTHER DEC PERMIT TYPE(S):
OTHER PERMIT NUMBER(S):
OTHER PERMIT EXP DATE(S):

RADIOACTIVE MATERIALS LICENSE NUMBER(S): N/A

RAM LICENSING AGENCY: ( ) NYCDOH (X) NYSDOH ( ) NYSDOL ( ) NRC

DATE OF PREVIOUS INSPECTION: First Inspection
CURRENT INSPECTION FREQUENCY: N/A

TYPE OF INSPECTION: (X) ANNOUNCED (X) SPECIAL ( ) INITIAL
( ) UNANNOUNCED ( ) ROUTINE ( ) PRE PERMIT

REPORTING INSPECTOR: William C. Tetley, P.E.

[signature] Signature   July 5, 94 Date

ACCOMPANYING INSPECTOR(S): ____________

INSPECTION RESULTS: (X) IN COMPLIANCE ( ) RECOMMENDATIONS GIVEN
( ) VIOLATIONS ( ) ENFORCEMENT ACTION NEEDED

NEXT INSPECTION DATE: ________ ( ) NORMAL ( ) MORE FREQUENT
( ) EXTENDED ( ) ASAP
NEW INSPECTION FREQUENCY: ________ (PRIORITY) ________

REVIEWED BY: [signature] DATE: 7/12/94

(6/93)

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Background:

SKW Alloys of Niagara Falls NY produces additives for steel, principally silicon and ferro-silicon. On April 26, 1994 a load of additives was rejected by a steel company in Indiana because the radiation alarms were set off. On April 28, 1994 a second load was rejected from a plant in Kentucky. These two shipments were returned to SKW.

Mr. Robert Kelly of the Department of Labor inspected the SKW facility and found that the slag from the first rejected load showed elevated radiation levels (a maximum of .3 mR/hr was measured). Mr. Kelly surveyed the facility and had SKW sequester any slag or other material which showed elevated radiation levels.

SKW suspected the problem was that prior to making the additive for these loads the facility had used Cerium Oxide in preparing a different additive (CFS-10). Cerium Oxide, as received by SKW, contains .25% ThO_2 as a trace contaminate. All of the contaminated slag identified by Mr. Kelly was made either during or after the Cerium Oxide runs.

Objective:

The inspection had the following objectives:

1. Determine the extent to which the facility was contaminated.
2. Take samples of contaminated material to determine what the type and concentration of the contaminant was.
3. Determine if any off-site contamination had occurred.

Instrumentation:

1. Bicron µrem meter
2. NaI 2x2 with the Ludlum 2221 Count Rate Meter (no window set).

Inspectors:

Mr. William C. Tetley, P.E., Environmental Radiation Specialist I

Description of Activities:

April 29, 1994

I arrived at SKW at about 10:00 a.m. on May 16, 1994. I met with Mr. Rasendu G. Trivedi (Russ), Director of Quality and Metallurgy, and Mr. Kenneth E. Kasprazk, Safety Manager. Mr. Trivedi provided me with the information given above in the Background section.

Mr. Trivedi provided me with information (attached) from Molycorp, Inc. which provides SKW with Cerium Oxide. This information gives the Thorium Oxide concentrations in the most recent shipments of Cerium Oxide received by SKW. The Thorium Oxide concentration averages .25%.

Mr. Trivedi escorted me on an inspection of the facility. Specific areas inspected are as follows (samples are summarized on Table 1):

- The returned loads were surveyed. The additive is in the form of chunks of metal about 2-3 inches in diameter. Mixed in with the metal are a small number (<1%) of pieces of slag about the same size. Three samples were taken, one of slag from Indiana, one of slag from Kentucky and a piece of metal from Indiana. The slag showed elevated radiation levels. I was not able to measure elevated readings from the metal from the Kentucky load.

- A load of slag made in the latest SKW run (not CFS-10) was surveyed, no elevated readings were found. A sample of this slag was taken.

- The slag pile in Bin 7 from Furnace 11 was surveyed. The radiation levels measured in this room were the highest found (170-190 μrem/hr). A sample of this slag was taken.

- A slag pile from previous runs was surveyed. No elevated readings were measured. A sample of this slag was taken.

- Dust from the Bag-house was surveyed. Readings of 100-120 μrem/hr were measured. A sample of the dust was taken.

- A container of Cerium Oxide was surveyed. Elevated readings were measured. A sample of Cerium Oxide was taken.

- The bottom of the West Mix Conveyer was surveyed. The dust at the bottom contained Cerium Oxide. Elevated readings were measured.

- Four off-site soil samples were taken from just outside the plant boundary (one in each direction).

- SKW was surveying each shipment of metal with a hand held meter prior to shipment. I assisted Mr. Kasprazk in surveying a shipment. The shipment contained a small number of pieces of slag which were found to give elevated readings. SKW decided to hold that shipment.

May 16, 1994

I returned to SKW at 10:00 a.m., I discussed with Mr. Trivedi the analysis of the samples taken previously and the conclusions drawn from them. I then took three additional samples.

Analysis of Samples:

The attached Table 1 gives the location of the samples taken. The results of the analysis of the samples is given in Table 2. The results are summarized as follows:

- The off-site samples contained only background levels of radioactive materials.

- The sample of Cerium Oxide contained about 100 pCi/g of thorium progeny. This is consistent with SKW's statement that Cerium Oxide contains about .25% Thorium. This concentration of thorium in Cerium Oxide is covered by an exemption to the NYS Department of Labor's Codes.

- Measurements made of the slag from the process contained concentrations of Ra-228, as inferred from Ac-228 activities, significantly (as much as 10 times) greater than that found in Cerium Oxide. The same slag contained far lower concentrations of Ra-224 (as inferred from the Bi-212 and Pb-212 activities) than Ra-228. Ra-228 is in the Thorium decay chain (see Figure 1). This indicates that the thorium decay chain is not in equilibrium.

- The activity of the Ra-226 (directly measured and inferred from Bi-214 and Pb-214) in the slag was significantly greater than in the cerium oxide. The increase was the same as seen in Ra-228.

- Samples of the product contained far lower activities of Ra-228 and Ra-226 than in the cerium oxide. Clearly the Radium is concentrating in the slag.

- Other on-site samples contained at most small amounts of Ra-226 and Ra-228. This indicates that most of the radium was collected in the slag, and the rest was diluted in other waste.

- No isotopes other than potassium (K-40), thorium and its progeny and uranium and its progeny were found in any of the samples.

The difference in concentrations of Ra-224 and Ra-228 in the slag was examined. The ratio of Ra-224 to Ra-228 decreased with time in these samples. This effect is shown in Figure 2. This can be explained by assuming the thorium and the radium (from the thorium decay chain) in the cerium oxide are chemically separated during processing. The Ra-224 has a short half-life (3.6 days). Since the Th-228 which feeds it has been removed from the cycle the Ra-224 decreases with time. The Ra-228 has a much longer half-life (6.7 years) and thus the concentration remained essentially constant during the analysis time period.

Conclusions:

The material that caused the radiation alarms to be set off was thorium and its progeny. This material is from Cerium Oxide used in the manufacture of steel additives. Cerium Oxide is covered by an exemption in the NYS DOL codes (the NYS DOL concurs that this material is exempt). No evidence of off-site contamination was found. Based on the above the Bureau has no regulatory authority over SKW.

Table 1

Sample Number	Location of Sample
Indiana	Sample of material taken from the load in Indiana, analyzed by the receiver.
SK042701	Solid piece of metal and slag from main pile in parking lot west of the bag-house (rejected from Indiana).
SK042702	Chips of metal from main pile in parking lot west of the bag-house (rejected from Indiana).
SK042901	Slag from material returned from Indiana.
SK042902	Metal from material returned from Kentucky.
SK042903	Slag from material returned from Kentucky.
SK042904	Slag from after the end of the CFS-10 run.
SK042905	Slag pile in Bin 7, Furnace 11. Slag from CFS-10 runs.
SK042906	Slag from runs prior to CFS-10 runs.
SK042907	Dust from the Bag-house.
	Off-site Soil Samples
SK042908	Route 31, South of plant
SK042909	Massachusetts Ave. and Hyde Park, East of plant
SK042910	Maple Ave., North East of plant
SK042911	Highland Ave. West of plant
SK042912	Sample of Cerium Oxide Moly Corp Product
SK051601	Metal from material returned from Indiana.
SK051602	CSF-10 material. (alloy)
SK051603	Bag-house dust

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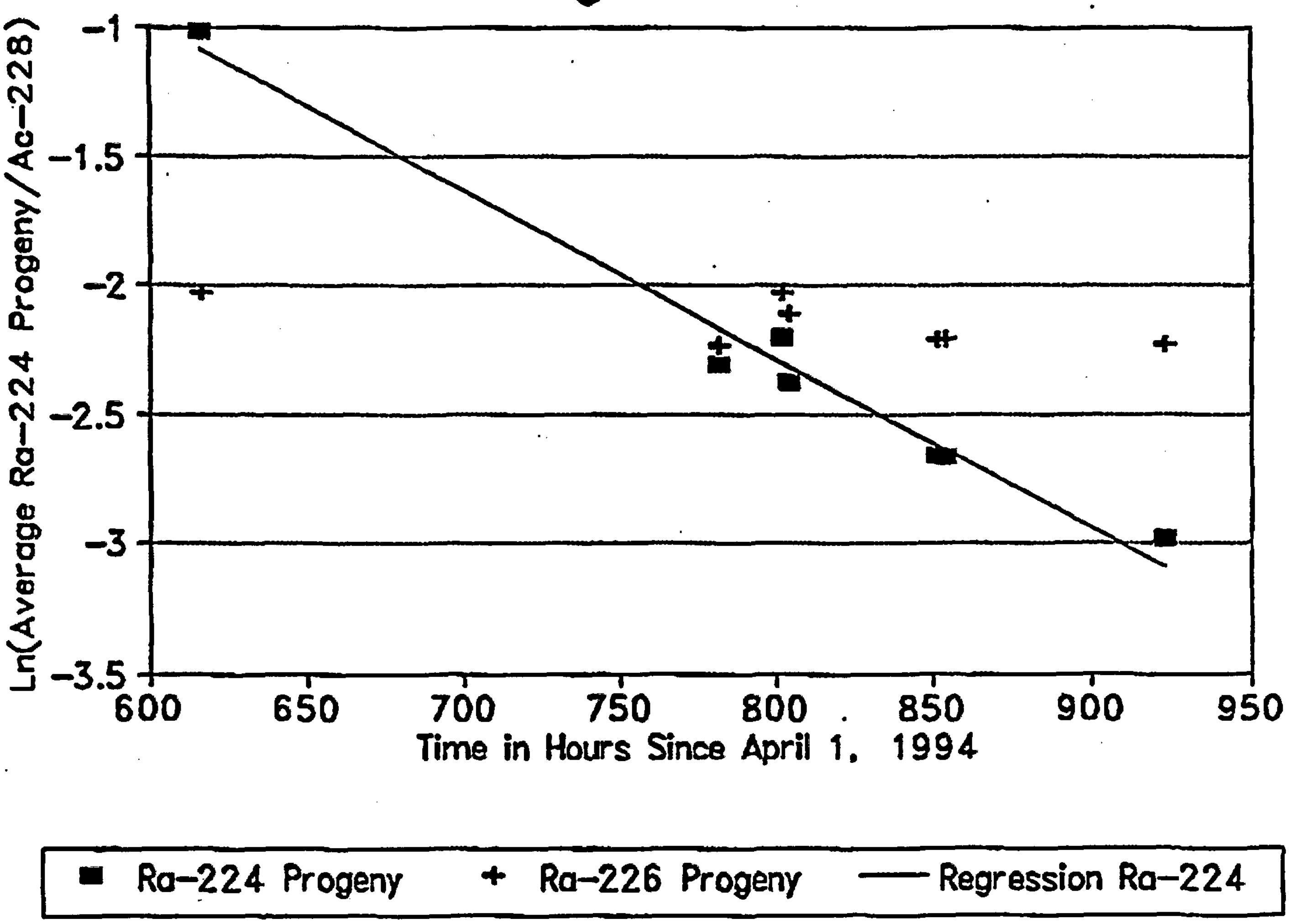
Table 2

Sample		Ra-228	Ra-224	Ra-226
Indiana		1039.0	375.5	137.0
SK042701		22.6	10.2	2.5
SK042702		12.3	8.2	1.4
SK042901		310.0	28.9	37.7
SK042902		1.3	1.7	
SK042903		592.0	59.1	63.3
SK042904	slag after run	4.5	1.6	4.5
SK042905	slag after	104.0	11.5	13.7
SK042906	Ceria run	2.4	1.8	4.7
SK042907		4.6	0.7	0.7
SK042908		0.6	0.6	0.8
SK042909			0.9	0.4
SK042910			1.0	1.4
SK042911		0.3	0.4	0.8
SK042912	Cerium oxide	113.0	110.4	10.8
SK051601		9.0	7.2	1.1
SK051602	Cerium oxide	21.1	37.7	1.1
SK051603		1.1	0.2	

Activities in pCi/g.

Figure 1



Ln(Average Ra-224 Progeny/Ac-228)
-1
-1.5
-2
-2.5
-3
-3.5
600
650
700
750
800
850
900
950
Time in Hours Since April 1, 1994
Ra-224 Progeny
Ra-226 Progeny
Regression Ra-224

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SKW METALS & ALLOYS, INC.
(Office & Plant Locations)

SKW CANADA - Office
St. Laurent, Quebec H4M 2M4

SKW CANADA INC. - Plant
Becancour, Quebec J0X 1B0

SKW METALS & ALLOYS, INC.
Calvert City, Kentucky 42029

SKW METALS & ALLOYS, INC.
Niagara Falls, N. Y. 14305

TECPRO, CORP. - Office
Atlanta, Georgia 30350

ESM II, INC. - Plant
Kingsbury, Indiana 46345

ESM II, INC. - Plant
Mars, Pennsylvania 16046

ESM II, INC. - Plant
Saxenburg, Pennsylvania 16056

AFFIVAL, INC. - Plant
Oakmont, Pennsylvania 15139

SKW Warehouse Locations

Birmingham AL 35228

Buffalo NY 14227

Chattanooga TN 37401

Chicago IL

Chicago Heights IL 60411

Dayton OH 45408

Decatur OL 62526

Fort Worth TX 76111

Galena Park TX 77547

Greensboro NC 27409

Maple Hieghts OH 44137

Muskegon MI 49443

Parkesburg PA 19365

Pittsburgh PA

Portland OR 97203

Southgate CA 90280

Tulsa OK 74110

West Allis WI 53214

Corporate Headquarters
SKW METALS & ALLOYS, INC.
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Niagara Falls, New York 14305
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FAX (716) 278-8897

SKW
Metals & Alloys

Product Catalog

Member VIAG Group

AFFILIATED COMPANIES

SKW TROSTBERG

SKW METALS & ALLOYS

SKW CANADA

SKW EAST ASIA

ESM II, INC.

FLG METALLURGIE

ANGLO BLACKWELLS

AFFIVAL INC.

TECPRO CORPORATION

	% Si	% Al	% Ca	OTHER
50% FeSi - Reg. Grade	47-51	1.25 max.	0.30 max.	—
50% FeSi - Low Al	47-51	0.50 max.	0.20 max.	—
50% FeSi - High Purity	47-51	0.10 max.	0.10 max.	0.03 max. Ti
75% FeSi - Reg. Grade	74-79	1.50 max.	0.50 max.	—
75% FeSi - Low C	74-79	—		0.02 max. C
75% FeSi - Low Al	74-79	0.50 max.	0.30 max.	—
75% FeSi - High Purity	74-79	0.10 max.	0.10 max.	0.040 max. Ti

APPLICATION: Ferrosilicon is used primarily as a deoxidizer. It readily combines with the oxygen in the molten metal. Sometimes used as a degasifer because of its affinity for undesirable gases. Used as a source of silicon in cast iron.

Magnesium Containing Alloys

	% Mg	% Si*	% Ca	% Ce	% T.R.E.	% AL**
Noduloy ®3	3.5-4.2	43-48	0.8-1.3	—	—	1.2 max.
Noduloy 5	5.5-6.5	43-48	0.8-1.3	—	—	1.2 max.
Noduloy 9	8.5-10	43-48	1.0-1.5	—	—	1.2 max.
Noduloy 5LC	5.5-6.5	43-48	0.8-1.3	0.3-0.4	—	1.2 max.
Noduloy 5C	5.5-6.5	43-48	0.8-1.3	0.5-0.75	—	1.2 max.
Noduloy 5C1	5.5-6.5	43-48	0.8-1.3	0.9-1.2	—	1.2 max.
Noduloy 3R	3.5-4.2	43-48	0.8-1.3	[0.9-1.2]	1.5-2.0	1.2 max.
Noduloy 5R-1	5.5-6.5	43-48	0.8-1.3	0.3-0.45	[0.5-0.85]	1.2 max.
Noduloy 5R-2	5.5-6.5	43-48	0.8-1.3	0.45-0.6	[0.75-1.15]	1.2 max.
Noduloy 5R-3	5.5-6.5	43-48	0.8-1.3	0.85-1.0	[1.45-2.0]	1.2 max.
Noduloy 5R-2+	6.0-7.0	43-46	1.7-2.3	0.45-0.6	[0.75-1.15]	1.2 max.
Noduloy 9R	8.5-10	43-48	0.8-1.3	0.35-0.5	[0.6-1.0]	1.2 max.
Noduloy 3R	3.5-4.2	43-48	0.8-1.3	[0.9-1.2]	1.5-2.0	1.2 max.

[] = Typical Range
*For certain Noduloy-Alloys a silicon level of 40-42% available. More utilization of returns possible, because of the lower silicon-addition during the magnesium treatment.
**For certain Noduloy-Alloys 0.5% maximum aluminum available.

High calcium, high magnesium alloys are available to minimize alloy addition; also, low aluminum and low calcium alloys are available for pressure pouring applications.

Inoculant

	% Si	% Al	% Ca	% Ba	% Ce	% T.R.E.	% Ti	% Mn	% Fe
Calsifer®50	46-50	0.5-1.4	0.6-1.0	—	—	—	—	—	—
Calsifer 75	74-79	0.75-1.5	0.5-1.0 1.0-1.5	—	—	—	—	—	—

APPLICATION: Specially sized and of proper composition for the inoculation of gray and ductile cast irons.

	% Si	% Al	% Ca	% Ba	% Ce	% T.R.E.	% Ti	% Mn	% Fe
Inoculoy®63	60-65	0.8-1.5	1.5-3.0	4-6	—	—	—	7-12	—
SB5	65-72	0.8-1.5	0.8-1.5	1.5-2.5	—	—	—	—	—

APPLICATION: Powerful inoculant for gray and ductile cast irons. High efficiency permits use of small additions. Provides excellent chill reduction in gray cast irons.

Inoculant (cont.)

	% Si	% Al	% Ca	% Ba	% Ce	% T.R.E.	% Ti	% Mn	% Fe
InocuChrome™	6-11	0.5 max.	0.5 max.	—	—	2-3	—	—	—

APPLICATION: (46-50% Chrome) Inoculant for gray cast irons for increasing mechanical properties.

	% Si	% Al	% Ca	% Ba	% Ce	% T.R.E.	% Ti	% Mn	% Fe
CFS - 10®	36-40	0.45	0.5 Max	—	9-11	10.5-15.0	—	0.4 Mg	Balance

→ Balance IRON.

APPLICATION: For reducing chill and providing proper graphite structure for optimum mechanical properties in gray cast iron. A source of cerium and rare earths for gray and ductile cast iron. Economical and flexible source of cerium for the production of ductile iron. Used in conjunction with magnesium ferrosilicon.

	% Si	% Al	% Ca	% Ba	% Ce	% T.R.E.	% Ti	% Mn	% Sr
Graphidox®	50-55	—	5-7	—	—	—	9-11	—	—

APPLICATION: Highly effective in supplementary deoxidation of steel for castings. Improves quality of steel castings and increases yield strength, ductility, and low temperature impact toughness properties.

	% Si	% Al	% Ca	% Ba	% Ce	% T.R.E.	% Ti	% Mn	% Sr
Low Calcium Graphidox®	50-55	—	0.5-1.5	—	—	—	9-11	—	—

APPLICATION: Highly effective proprietary inoculant designed for effective, economical inoculation of both gray cast iron and compacted graphite irons. This titanium bearing ferroalloy is highly efficient as both a graphidizer and deoxidizer. In addition, titanium in LOW CALCIUM GRAPHIDOX reacts with nitrogen in iron to reduce chances of nitrogen porosity.

	% Si	% Al	% Ca	% Ba	% Ce	% T.R.E.	% Ti	% Mn	% Sr
SRF-50	44-48	0.5 max.	0.10 max.	—	—	—	—	—	0.8-1.2
SRF-75	74-79	0.5 max.	0.10 max.	—	—	—	—	—	0.8-1.2

APPLICATION: Proprietary inoculant containing strontium, the most potent element for reducing chill and promoting type A graphite structure in gray iron. Offer good machinability while keeping tensile strength and hardness to a minimum.
*Lower silicon values are possible with sizes of 8M and finer.

ESM Desulfurizers

X-1	Calcium oxide used with continuous porous plug cupola runner application.
S-1	Calcium fluoride used with continuous porous plug cupola runner applications.
LoSul B-1050	Bagged calcium oxide base product used in foundry ladle desulfurization applications.

APPLICATION: Environmentally acceptable alternatives to calcium carbide for the desulfurization of cast iron in the production of ductile iron; can be applied to continuous or batch processing; cupola or electric base iron; sulfur levels below .010% are obtainable.

Specialty Metals and Alloys

	% Cr	% Fe	% Si	% Al	% C	% S	% O_2	% N_2
A. T. Chromium Metal	99 min.	0.20 max.	0.10 max.	0.10	0.03 max.	0.01 max.	0.10 max.	0.015 max.

	% Mo	% C	% S	% P	% Si	% Cu	—	—
Ferro Molybdenum	60-70	0.10 max.	0.15 max.	0.05 max.	1.00 max.	0.05 max.		
Moly Oxide	57 min.	—	0.10 max.	0.05 max.	—	0.50 max.		

APPLICATION: These metals and alloys are used in the production of low and high alloy steels, tool and high speed steels, and cast irons. Other applications are stainless and heat resisting alloys, welding and hardfacing alloys, air and vacuum melted superalloys, and aluminum alloys.

Calcium Containing Alloys

	% Ca	% Si	% Ba	% Mn	% Al
CaSi	29-33	59-63	—	—	1.75 max.
BaCaSi	14-18	55-62	14-18	—	1.75 max.

APPLICATION: Calcium silicon is available in lump, powder and cored wire form. It is a universal deoxidizing and desulfurizing agent in the production of high grade steels. In combination with aluminum, it is used where very high demands are made on the castability, degree of purity and surface quality of steel.

Cored Wire

APPLICATION: Available in the following alloys: (CaSi, CaSiBa, CaC_2, FeB, FeTi, C, Pb, Sulfur); other filling material available on request. Alloys for desulfurization, Mg treatment, and inoculation of cast iron also available.

Manganese Containing Alloys

	% Mn	% Si	% C	% P
Silico Manganese	65-68	16-18.5	2.0 max.	0.20 max.
M. C. FeMn	80-85	1.00 max.	1.5 max.	0.30 max.
Std. FeMn	70 min.	1.20 max.	6-8	0.30 max.

APPLICATION: Manganese gives strength to steel, counteracts the embrittling effect of sulfur, and increases nitrogen solubility.

Chromium Containing Alloys

	% Cr	% Si	% P	% C
FeCrSi	35-40	39-43	0.030 max.	0.05 max.
HCFeCr	60-70	3.0 max.	0.030 max.	8.0 max.
LCFeCr	65-75	1.0 max.	0.030 max.	0.05 max.

APPLICATION: Chrome addition conveys hardenability, corrosion resistance, high strength, and high temperature stability. It also produces a fine crystalline structure.

Welding Products and Powdered Alloys

	MESH	% Si	% C	% P	% S
Ferrosilicon 50% Grade, Unstabilized	40 x 325	47.0 min.	0.12 max.	0.04 max.	0.02 max.
Ferrosilicon 50% Grade, Stabilized	40 x 325	47.0 min.	0.12 max.	0.04 max.	0.02 max.

APPLICATION: Stabilized and unstabilized Ferrosilicon is used in fluxes for both welding electrodes and core wire.

Silicon Metal

	% Si	% Al	% Ca
0.35/0.50% Max. - Fe Grade			
—Regular	98.5 min.	0.50 max.	0.20 max.
—Low Ca	98.5 min.	0.50 max	0.70 max.

APPLICATION: Silicon Metal is used in alloying aluminum and steel. It is used as a raw material for the chemical industry producing silicones and high purity grades of electronic and solar silicon.

	% Si	% Al	% Ca
1.00% Max. - Fe Grade			
—Regular	98.5 min.	0.75 max.	0.40 max.
—Low Ca	98.5 min.	0.75 max.	0.20 max.
Special Grades	99.0 min.	—	—

APPLICATION: Al, Ca, P, Pb, Fe, Ti, Mn, etc. according to specific customer specifications.

Silica Fume

	% SiO_2
Ferrosilicon Fume	83.0 min.
Silicon Metal Fume	95.0 min.

APPLICATION: Silica Fume is used to produce high quality concrete with increased strength and durability. It is also used by the refractory and the prefab chimney industries.